BTL-08 Lx ECG Series

SERVICE'S MANUAL

V100z1IE04/07/2007EN

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1 GENERAL CHARACTERISTICS

BTL-08Lx ECG Series devices are up-to-date ECG systems for monitoring and recording of resting electrocardiogram. They provide detailed analysis*, diagnostics* and printing of ECG records. The outstanding features including a wide variety of functions and easy operation make the unit an excellent cardiology tool.

BTL-08Lx ECG Series devices are equipped with accumulator batteries that make them fully portable equipment the use of which is not limited to the physician's office.

The assortment of types of the **BTL-08Lx ECG Series** devices include two devices equipped with the graphic display and the 210-mm-wide printer which enables printing of all twelve leads at a time. The devices enable printing also on the ordinary thermo-sensitive "fax" paper which significantly reduces the operational costs. The smaller b/w as well as the larger colour display excel at the quality of displaying and are equipped with touch-panel which enables control directly on the screen. You can select a device that will meet your requirements as perfectly as possible.

BTL-08Lx ECG Series devices stand out with easy and intuitive operation that can be quickly mastered by anyone. ECG recording can start immediately after switch-on of the equipment.

Both types of the **BTL-08Lx ECG Series** devices have a patient database and enable to record and store in the memory many 10-second and longer records from all leads and/or several-minutes-long records from two selected leads – "LONG" type records. The equipment can be also used for ergometric examinations (in connection with the **BTL-08 Win Ergo** software.

BTL-08Lx ECG Series devices can be also connected to the ergometry equipment which is controlled by the computer with the **BTL-08 Win Ergo** program.

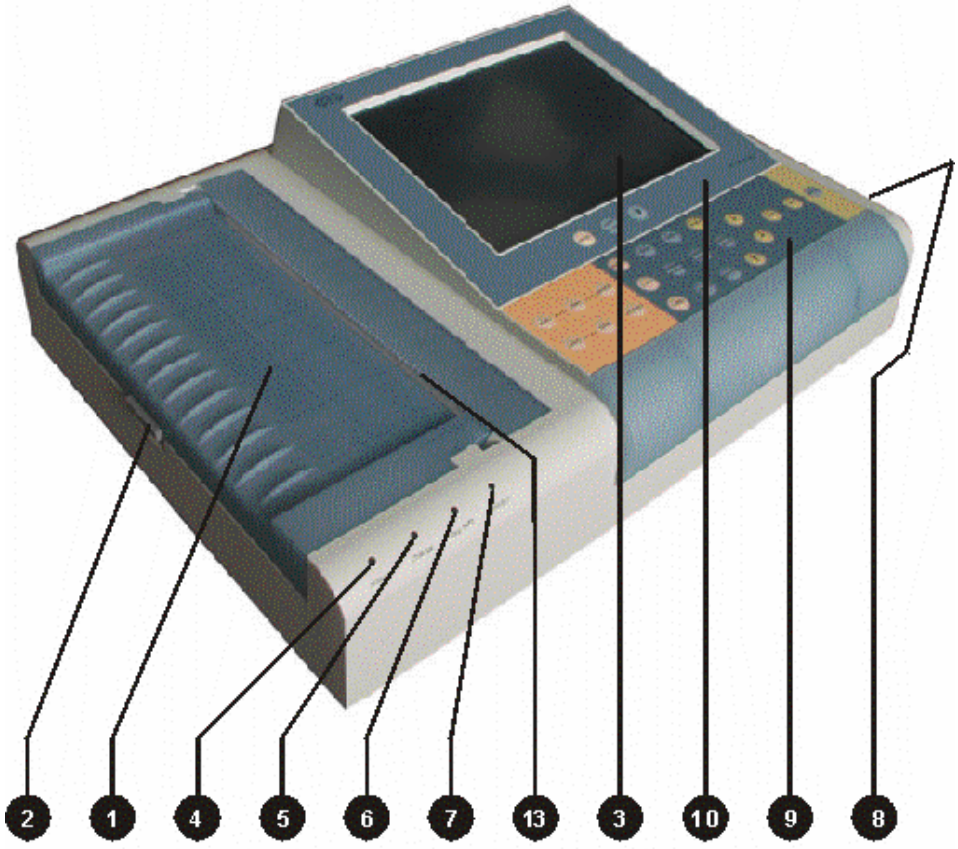
For the latest information about BTL products and contact to BTL companies please visit our website: http://www.btlnet.com.

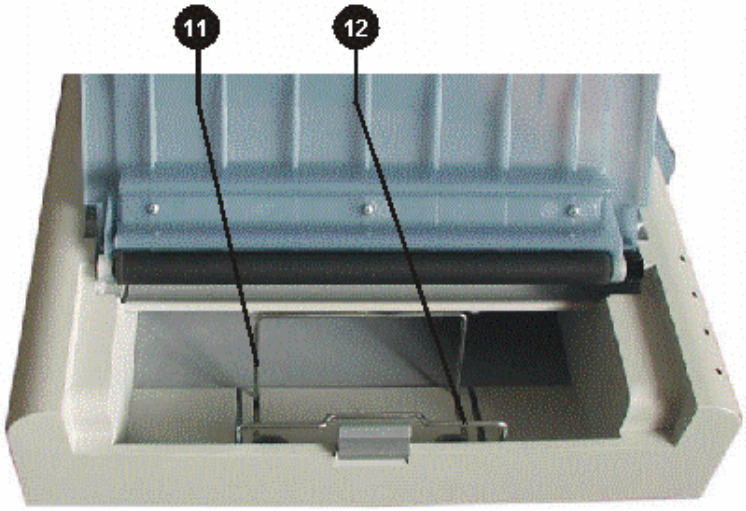
** only if the equipment is upgraded by the Diagnostics software module*

2 INSTRUCTIONS FOR USE

2.1 OUTWARD APPEARANCE

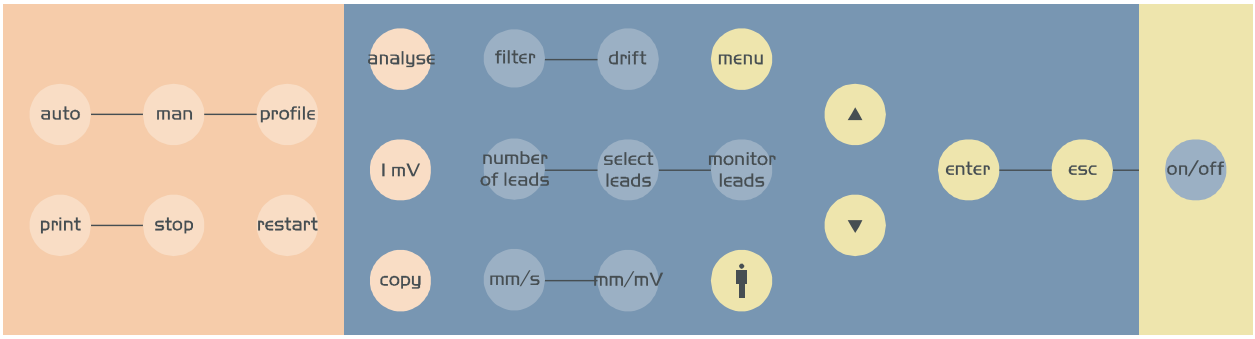
2.1.1 Top Panel of the Equipment





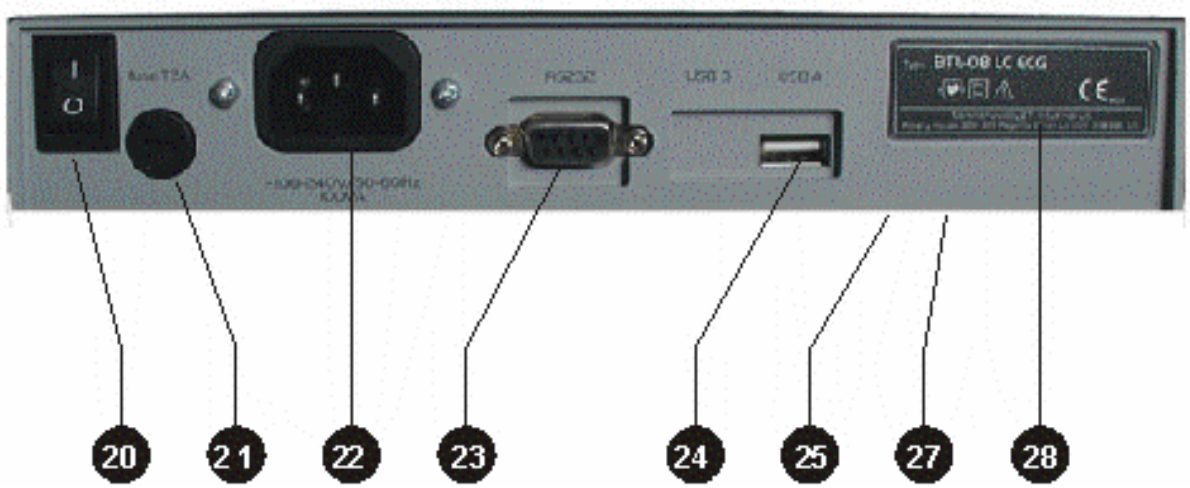
1. printer cover
2. lever for opening the printer
3. touch screen
4. indication of ON status (**power**)
5. indication of charging of accumulators (**charge**)
6. indication of run-down accumulators (**low batt**)
7. indication of printer error (**printer**)
8. connector for the patient cable
9. keyboard for setting of print and record options
10. keyboard for setting of display view
11. holder for the fax paper
12. prop for the Z-foldered paper
13. tearing edge for the fax paper

2.1.2 Keyboard



For description of individual buttons see **Functions of the Keyboard Buttons.**

2.1.3 Rear Panel of the Equipment



20. power switch – positions 0 / I
21. mains fuse

22. mains cable connector
23. communication connector for connection to PC via the RS232 line
24. connector for connection to PC via USB
25. anti-interference clamp (on the bottom cover of the equipment)
26. type label
27. manufacture and warning label (on the bottom cover of the equipment)

2.2 ASSEMBLY AND PUTTING INTO OPERATION

Unpack the equipment and place it on a stable horizontal surface proportioned for the equipment's weight, out of reach of sunlight. During the operation the equipment gets warm, therefore it must not be located close to heat-producing devices. Cooling of the equipment is provided by forced air circulation. Cooling vents are located at the bottom of the equipment and around the display and must not be covered. Do not put the equipment on a soft surface so as not to obstruct airflow to the bottom cooling vents. Do not put any heat-producing devices on the equipment, neither objects containing water or other liquid. Do not place the equipment close to devices producing strong electromagnetic, electric or magnetic field (diathermy, X-rays, etc.), otherwise the equipment could be undesirably influenced. The ECG paper is heat-sensitive and therefore should be also located out of reach of heat emitters, including sunlight - see **Storage Conditions for Thermo-Sensitive Paper**. In case of any questions please contact the authorized BTL service department.

We recommend keeping the packing of the equipment for further possible transport.

Plug the device directly in the mains socket; do not use any multi-connection extension cable or adapter.

Switching the device on:
Plug the mains cable in the mains socket, switch the **O**/ **I** rocker switch (**20**) on the rear panel to the **I** position and press the **on/off** switch on the keyboard. The ON status is indicated by the pilot light **(4)**.
The mains switch (**20**) should be permanently in the **I** position so that recharging of the accumulators is ensured.

Recharging of accumulator:
The device contains an internal accumulator, which is sold in half-charged status. That is why we recommend formatting of the accumulator after purchase of the device: connect the device to the mains with the **mains rocker switch** (**20)** in position **1** for at least 48 hours without interruption. The device will be recharged and the accumulator will be properly formatted. The properly formatted accumulator enables longer operation of the device without recharging. For details see **2.6 Accumulator**.

2.3 FUNCTIONS OF THE KEYBOARD BUTTONS

2.3.1 auto

Pressing of the **print** button in this profile starts recording of ECG signal from 12 leads and (for the types which are equipped with the DIAGNOSTICS software module) its printing with analysis and verbal interpretation. Print reports depend on the type and settings – for selection use buttons **number of leads** and **select leads**. At the same time, the internal memory of the equipment stores 10 or more seconds of the signal (according to the settings) which can be later printed, analyzed and saved to the patient data – buttons **copy**, **analyse**, **patient**, **menu**. The "auto" profile also enables setting of retrospective printing (the minus time of start of printing), i.e. it is possible to print and save an event which has already passed, up to 10 seconds back in time). To interrupt printing press the **stop** button. This mode is indicated by the word "automat" in the status bar on the display.

The "auto" mode can be also selected directly on the touch screen. After touching the display at any point there appear the top and bottom toolbars. After pressing the **profile** button there appears a menu containing all profiles available in the device.

2.3.2 man

Manual recording of ECG signal from 12 leads. Number of printed leads depends on the settings - for selection use buttons **number of leads** and **select leads**. This mode serves only for direct recording of the ECG signal, the signal is not recorded in the memory. The print parameters can be selected even during printing. To start printing press the **print** button, to stop printing press **stop**. This mode is indicated by the word "manual" in the status bar on the display.

The "manual" mode can be also selected directly on the touch screen. After touching the display at any point there appear the top and bottom toolbars. After pressing the **profile** button there appears a menu containing all profiles available in the device.

2.3.3 profile

Selection of one of possible user profiles (all profiles except auto, man and print screen - see above) which can be edited in **profile setup**. The highlighting shifts cyclically on the available profiles. Recording is run according to parameters which are preset in the equipment's memory. At the same time, the internal memory of the equipment stores 10 or more seconds of the signal (according to the settings) which can be later printed, analyzed and saved to the patient data – buttons **copy**, **analyse**, **patient**, **menu** (only for profiles derived from the automat type). To interrupt printing press the **stop** button. The current mode is indicated in the bottom status bar on the display.

The profile can be also selected directly on the touch screen. After touching the display at any point there appear the top and bottom toolbars. After pressing the **profile** button there appears a menu containing all profiles available in the device.

2.3.4 print

Press this button to start printing of the record and possibly saving in the memory in the set profile.

2.3.5 stop

Press this button to interrupt the running print. If the device is busy, e.g. by analysis of the signal, the response for pressing the **stop** button may be delayed. In such case wait until the device stops the running operation and then press the button again.

2.3.6 analyse

Button for printing of verbal interpretation and the table with the results of analysis of the last record taken in the **automat** or a derived mode. It is active only if the DIAGNOSTICS module is implemented.

2.3.7 copy

Button for reprinting of the last record taken in the **automat** or a derived mode. Printing is performed with the current values of filters, sensitivity and speed, so, if the values have changed since the last recording in the automat mode, the result of the print may differ from the original. If you need an absolutely identical copy, set the speed, sensitivity and filters the same as in the original and only then press **copy**.

2.3.8 1 mV

Button for printing of the calibration signal of the amplitude 1 mV. The mark is printed only when printing in the **manual** mode.

2.3.9 restart

Button for restarting of ECG inputs and ECG internal amplifiers. Use this button if you are not sure about the quality of the measured ECG record or if the ECG-curves are out of the display.

2.3.10 number of leads

Button for selection of the number of leads to be printed. To select the required combination press this button repeatedly. The current combination is displayed in the top status bar on the display. The resulting setting depends on the currently selected profile, manual or automat.

The number of leads to be printed can be also selected directly on the touch screen. After touching the display at any point there appear the top and bottom toolbars. After pressing the **print** button there appears a screen containing all possible numbers of leads to be printed.

2.3.11 select leads

Button for selection of groups of leads to be printed. The groups of leads cyclically shift when pressing the button. The selected leads are displayed in the top status bar on the display. The function is active only in the **manual** mode and only if less than 12 leads at a time are printed.

2.3.12 mm/s

Button for setting of the paper feed speed. The particular speed values cyclically shift when pressing the button. The current paper speed is displayed in the top status bar on the display.

The paper speed can be also selected directly on the touch screen. After touching the display at any point there appear the top and bottom toolbars. After pressing the **speed** button there appears a screen containing all possible values of the paper speed.

2.3.13 mm/mV

Button for setting of the sensitivity of print. The particular sensitivity values cyclically shift when pressing the button. The current sensitivity value is displayed in the top status bar on the display. Sensitivity can be also changed during printing in the **manual** mode.

Sensitivity can be also selected directly on the touch screen. After touching the display at any point there appear the top and bottom toolbars. After pressing the **sensitivity** touch button there appears a screen containing all possible values of record sensitivity.

2.3.14 filter-

Button for setting of mains noise filter, muscular filters and artifact filter. The particular filters or their combinations cyclically shift when pressing the button. The current filter or combination of filters is displayed in the top status bar on the display. It is possible to select the **adaptive auto** filter which on the basis of the signal analysis automatically activates the needed filter so that the quality of the resulting signal is maximum. The **adaptive auto** filter cannot be combined with other filters.

Filters and their combinations can be also selected directly on the touch screen. After touching the display at any point there appear the top and bottom toolbars. After pressing the **filters** button there appears a screen containing all available filters. Here it is possible to activate any filter or combination.

2.3.15 drift

Button for cyclical switching among the base-line filters (**A**nti **D**rift **S**ystem). The current filter or combination of filters is displayed in the top status bar on the display. It is possible to select the **adaptive auto** filter which on the basis of the signal analysis automatically activates the needed filter so that the quality of the resulting signal is maximum. The **adaptive auto** filter cannot be combined with other filters.

Filters and their combinations can be also selected directly on the touch screen. After touching the display at any point there appear the top and bottom toolbars. After pressing the **filters** button there appears a screen containing all available filters. Here it is possible to activate any filter or combination.

2.3.16 monitor leads

Button for cyclical switching among the leads displayed on the screen. If the screen displays less than 12 leads at a time, this button enables to switch cyclically to other leads which are not currently displayed. The displaying and number of leads depends on the current display setting (**mode** button).

The leads for displaying can be also switched on the touch screen. After touching the display at any point there appear the top and bottom toolbars. The **monitor leads** button on the screen has the same function as the analogous button on the keyboard.

2.3.17 patient

Button for opening of the dialogue window for entering data of a new patient. To save data press **OK**. These data are printed in the record and stored in the memory together with the record and can be loaded from the database (see **Record Database**) in the menu, viewed and/or printed on the ECG paper. The types of data to be entered and stored can be selected in the unit settings (see **Patient Card Setup**).

2.3.18 menu

Button for activation of the menu containing the unit setup, patient data management, etc.

The menu can be also entered directly from the touch screen. After touching the display at any point there appear the top and bottom toolbars. After pressing the **menu** button (in the lower right corner) there appears a menu as after pressing the keyboard button.

2.3.19 mode

Button for selection of the arrangement of displaying of leads on the display, from 3 leads on the display at a time up to all 12 lead in more columns. All possible variants of displaying rotate on the screen when pressing the button.

The appearance on the display can be also changed in details on the touch screen. After touching the display at any point there appear the top and bottom toolbars. After pressing the **menu** button on the keyboard or on the display the device menu appears which contains the **displayed leads** button. After pressing the button there appears a screen containing all available display combinations including the possibility of assigning a certain lead to a certain window on the display.

2.3.20 print screen

Button for instant printing and saving of the screen status using the special **print screen** profile. This profile serves for capturing of sudden artifacts which the operator spots on the display, therefore recording and printing starts immediately after pressing this button and it is not necessary to start recording by the **print** button. This profile also enables to set retrospective printing (the minus time of the start of printing), i.e. it is possible to print and save an event which has already passed, up to 10 seconds back in time. The profile is configured similarly to the "auto" profile.

2.3.21 contrast

Button for prompt setting of the display contrast. The contrast can be also changed in the equipment settings menu.

Note:
At the colour display, the change of contrast may lead to change of the colour representation of the current colour scheme.

2.3.22 esc

Button for rejection of a selection and/or return to a higher dialogue window in the menu without saving the entered values.
The touch button on the screen, if displayed, has the same function as the keyboard button.

2.3.23 enter

Button for confirmation of a selection and saving of the value and/or for entering the lower window in the menu.
The touch button on the screen, if displayed, has the same function as the keyboard button.

2.3.24 up / down arrow

Buttons for movement in the menu and/or for change of values.
The touch buttons on the screen, if displayed, have the same function as the keyboard buttons.

2.3.25 on/off

Button for switching the device on / off. At switching off, the device checks the status of the accumulators and if it finds them low, it switches to the charging mode; in the charging mode the display is dark and the **power** and **charge** indicators are shining. After recharging of the accumulator the device automatically switches off completely. The charging mode is activated only if the device is plugged in the mains and the mains rocker switch (**20**) on the rear panel is in the **I** position. If the device is not connected or the switch **(20)** is in the **0** position, the device switches off.

Note!
Checking of the accumulator status takes some time, therefore the device may respond with a delay after switching off and then on again.
All saved data remain stored even if power supply is off.

2.3.26 form feed (FF)

This button is available only on the touch screen. After touching the display at any point there appear the top and bottom toolbars. The **FF** ("form feed") button is in the bottom left corner. After pressing this button the paper slightly ejects from the printer, either to the next page (Z-foldered paper) or by approx. 3cm (fax paper). The button may be pressed repeatedly. For details on how to work with paper see **Printer and Paper**.

2.3.27 restart - Restarting and Reset of the Device

If for some reason (electromagnetic interference, etc.) the device stops responding to the user's commands (keyboard, touch panel) and the message "please wait..." with small moving squares are not displayed, the device can

be put into the initial state by simultaneous pressing of the **esc** and **restart** buttons. After this action the device immediately restarts. After the restart it is possible to continue the work with the device.

Note:
If the device is in the above-described state ("no response"), the **on/off** button is also disabled. The only help is to reset the device, as described above.

2.4 CHECK OF LOOSE LEADS

If an electrode is wrongly attached to the patient, has bad contact or is not connected, ECG warns of this fact by symbolic texts in the bottom status bar on the display (texts RLFN, V1, V2, V3, V4, V5, V6). In such case it is recommended to check attachment of the electrodes, press the **restart** button and record the ECG signal only after the equipment stops reporting error.

If you continue recording when the equipment reports a problem on a lead, there may occur considerable distortion of the signal.

Note:
When using the automat profile, the device checks the quality of signal (connection of electrode) before recording, and starts recording only when all electrodes are properly connected. This function can be enabled/disabled in the profile configuration. The individual stages of recording are clearly indicated on the display.

2.5 PRINTER AND PAPER

The used printer prints on thermo-sensitive paper. Quality of the paper may considerably affect quality of the printed ECG-curves. For high-quality printing it is recommended to use only the BTL-recommended paper.

The yellow pilot light (**7**) indicates printer error status. Possible causes:

- printer is out of paper
- improperly closed printer cover or wrong type of paper or wrongly set type of paper.

At the same time there appears an error message with additional information on the display.

2.5.1 Paper Sensitivity

Each type of paper has slightly different sensitivity to thermal impulses produced by the printer. The resulting printout can be too bright and illegible or, on the other hand, too dark or even overburned (overburned print has a white centre in the printed line).
For the above reasons the device is designed so that it adapts to various types of paper. For setting the paper sensitivity use the **paper sensitivity** item in **menu – unit setup – setting of paper and print**. The more sensitive paper is set, the brighter is the resulting printout. There are 5 levels of sensitivity setting available. It is recommended to test the setting on several printouts after any change of the paper type.

2.5.2 Roll ECG Paper

The device can print on the thermo-sensitive fax (=roll) paper with preprinted grid, nominal width 210 mm (for more detailed specification see Chapter **Technical Parameters**). For high-quality print we recommend exclusive use of paper supplied by the BTL companies. For the fax paper, the paper type must be correctly selected in **menu – unit setup - setting of paper and print** - type **for fax**. When using the paper with the preprinted grid it is necessary to disable the **print grid** item on the same screen. If the printer contains another type of paper than set in the unit setup, the device reports an error after a short while of printing.

Inserting paper: Press button (**2**) to open the printer cover (**1**). Tilt the fax paper holder (**11**) towards the printer. Insert the paper roll, the thermo-sensitive layer (grid) facing the printer head (display) so that the paper overlaps the tearing edge (**13**). Click the printer cover shut. The pilot light (**7**) indicating that the printer is out of paper stops shining. The printer is ready. To check if the paper is inserted and set correctly check **menu – unit setup - setting of paper and print** after pressing the **insert paper** touch button.

The button for inserting paper or feed to the next page (FF – form feed) is available also in the lower left corner of the on-line screen after touching the screen at any point. By this button you can eject the paper slightly from the printer at any time.

Tearing of paper: It is recommended to tear the fax paper by pulling it from the bottom margin over the tearing edge **13** towards the display.

ATTENTION
It is essential to insert paper carefully and absolutely parallel to the tearing edge (the grid on the paper must be parallel to the tearing edge), otherwise it will later bend to a side and possibly crumple or tear.

2.5.3 Fax Paper without Grid

The device can also print on a standard thermo-sensitive white fax paper without the preprinted grid. In such case it is necessary to enable the **print grid** item in **menu – unit setup - setting of paper and print**. Other settings and handling are the same as for the paper with the preprinted grid.

ATTENTION
It is essential to insert paper carefully and absolutely parallel to the tearing edge, otherwise it will later bend to a side and possibly crumple or tear.

2.5.4 Z-foldered Paper (perforated)

It is also possible to use the thermo-sensitive Z-foldered paper with preprinted grid, nominal width 210 mm (for more detailed specification see Chapter **Technical Parameters**). For high-quality print we recommend exclusive use of paper supplied by the BTL companies. For the Z-foldered paper, the paper type must be correctly selected in **menu – unit setup - setting of paper and print** - type **perforated** (Z-foldered). At the first use of a new type of Z-foldered paper it is necessary to measure some of its dimensions and enter the measured values in the device. The dimensions are: page width of the used paper (C), mark width (B) and distance between the mark and perforation (A). The measured dimensions are indicated in the picture on the screen. The arrow shows in which direction the paper gets out of the device. If the wrong values are set, the device will not eject the paper properly on the perforation which will prevent proper tearing of paper. If paper with the preprinted grid is used, disable the **print grid** item. If there is inserted another type of paper than set in the unit setup, the device reports an error at the attempt for printing. Never insert more paper sheets in the paper stack than stated in Chapter **Technical Parameters.**

Inserting paper: Press button (**2**) to open the printer cover (**1**). Tilt the fax paper holder (**11**) away from the printer (display). Insert the Z-foldered paper bundle in the paper stack, the thermo-sensitive layer (grid) facing the printer head (display) so that the paper overlaps the tearing edge (**13**). Click the printer cover shut. The pilot light (**7**) indicating that the printer is out of paper stops shining. The printer is ready. To check if the paper is inserted and set correctly check **menu – unit setup - setting of paper and print** after pressing the **insert paper** touch button (if all dimensions of the paper are set correctly, the paper ejects from the device up to the next perforation. We recommend using this button after each insertion (replacement) of Z-foldered paper.

The button for inserting paper or feed to the next page (FF – form feed) is available also in the lower left corner of the on-line screen after touching the screen at any point. By this button you can eject the paper slightly from the printer at any time.

Tearing of paper: We recommend not to tear the Z-foldered paper over the tearing edge **13** (which is designed particularly for the fax paper) but over the edge of the printer cover, away from the display. Thus the paper will tear exactly along the perforation and its margin will not be damaged by the tearing edge.

Note:
For easier taking the Z-foldered paper out serves the prop (**12**) which enables to lift the bundle up and then take it in hand and pull out of the paper stack.

ATTENTION
It is essential to insert paper carefully and absolutely parallel to the tearing edge (the grid on the paper must be parallel to the tearing edge), otherwise it will later bend to a side and possibly crumple or tear.
THE Z-FOLDERED PAPER IS EXTREMELY SENSITIVE TO PROPER INSERTION. IF IT IS INSERTED IMPROPERLY IT CRUMPLES AND TEARS DURING PRINTING.

2.5.5 Storage Conditions for Thermo-Sensitive Paper

The printer is designed for thermo-sensitive paper. To achieve as long as possible time stability of the printout, it is essential to keep the following terms of storage of new as well as of the printed paper:

- storage temperature 25 °C and lower
- relative humidity 65% and lower
- do not expose paper to the sunlight
- do not expose paper to long-lasting radiation of fluorescent sources (tubes, etc.)

- prevent contact of paper with glue based on alcohol, ester, ketone, etc. Use only dispersive glue based on starch, PVA or CMC.
- prevent any direct contact of the paper with PVC packages. These packages contain substances based on ester which would spoil the thermo-sensitive layer and cause vanishing of the record.

2.6 ACCUMULATOR

The type of the accumulator is stated in Chapter **Technical Parameters**. Its replacement is provided by the authorized BTL service department.

During operation the accumulator is continuously being recharged from the mains. Its recharging and keeping charged is running even if the equipment is switched off and connected to mains and the mains switch (**20**) on the rear panel is in position **I**. At switching off, the device checks the status of the accumulators and if it finds them low, it switches to the charging mode; in the charging mode the display is dark and the **power** and **charge** pilot lights are shining. After recharging of the accumulator the device automatically switches off completely. Note that the charging process runs only if the device is plugged in the mains and the rocker switch (**20**) on the rear panel is in the **I** position.

Checking of the accumulator status may take some time, therefore the device may respond with a delay after switching off and then on again.

For full charging of the accumulator let it recharge for approximately 6 hours – preferably overnight.

A low accumulator is signalled in two levels of signalling.
- the accumulator is low, but it is still possible to print for a short time – the **low batt** indicator (**6**) is blinking
- the accumulator is dead, the device cannot print – the **low batt** indicator (**6**) is shining permanently and at the same time there is a warning acoustic signal (short intermittent beeping approx. once every 20 seconds). The acoustic signalling can be disabled, see Chapter **Battery Status Indication.**

During charging of the accumulator the **charge** indicator (**5**) is shining.

If the "low battery" status is indicated, it is likely that the equipment will not be able to print the entire ECG record. During recording and printing the process may be interrupted. However, the data are still saved in the memory and can be printed after recharging of the accumulator.
To ensure a long lifetime of the accumulator we recommend keeping it permanently charged. When it is possible, connect the ECG to the mains and put the mains switch (**20**) to the **I** position. The pilot light (5) will start shining (after recharging it will go out) and the accumulator will be automatically kept in the charged status.
If the device is left unplugged from the mains for a longer time (even in the OFF status), the accumulators gradually spontaneously discharge. This effect is characteristic of the accumulators and cannot be removed; therefore, if the device has been off and unplugged for a longer time than approximately 2-3 months, we recommend recharging it, preferably for 48 hours without interruption.
For the same reason we recommend charging the device continuously for at least 48 hours immediately after purchase, regardless of the accumulator status indication (you can work with the device normally, only do not unplug it from the adapter, the accumulator recharges even during standard operation of the device). Thus the accumulator gets so –called formatted and will keep working longer without recharging.

2.7 LITHIUM BATTERY

The device contains a lithium battery for backup of date and time. The type of the battery is written in Chapter **Technical Parameters**. Its replacement is provided by the authorized BTL service department.

3 EXAMINATION

3.1 "ON LINE" MODE

This mode is automatically started after switch-on of the equipment. The display in this mode displays the recorded ECG signal and the following information:

- the selected print profile (auto, manual, long…)
- heart rate (HR)
- paper speed
- set sensitivity
- set filters
- loose leads, if any
- names of the displayed leads
- number and names of leads to be printed
- ECG-curve
- during saving of a 10-sec-long to 80-sec-long record in the equipment's memory there is displayed description and indicator of the progress
- if the device is busy (e.g. by analysis or interpretation), the display show the message "please wait…".

After touching the screen in the on-line mode there appear the top and bottom toolbars with buttons serving for setting of parameters, similarly as the keyboard. After approximately 2 seconds without a touch, the toolbars automatically hide.

After switch-on the equipment permanently monitors the input ECG signal and always remembers the last 10 seconds of the signal. This signal can be retrospectively stored and printed in a suitable profile and settings (profile **auto** or **print screen,** item **start time** lower than 0 (0 = start at the moment of pressing the button, -10 = start of printing of the signal 10 seconds before pressing the button)).

3.2 SELECTION OF PROFILE FOR ECG RECORDING

Profiles are pre-set recording and printing parameters that serve for quick setting of the equipment for print. Parameters of the profiles are preset by the manufacturer and can be changed in the equipment's menu. Besides basic profiles **automat** (**auto** button), **manual** (**man** button) and **print screen** (**print screen** button) it is possible to set many user profiles (when pressing the **profile** button, the available profiles cyclically shift).
The set profile parameters can be changed by pressing of the respective button at any time before and/or during recording.
To start recording of the signal press the **print** button. Termination of recording is either automatic after the time set in the profile elapses, or manual by pressing the **stop** button. Depending on the set profile, the device may record data or analyse the signal for some more time. If the device is performing a background job, a small blinking circle appears in the upper right corner of the display, or a circle with the text "wait please". The analysis and storage of the signal may be very time-consuming operations.

3.3 POSITION OF ELECTRODES

Quality of the ECG record is particularly dependent on the contact between the electrode and the patient's skin. To keep the contact as good as possible please observe the following principles:

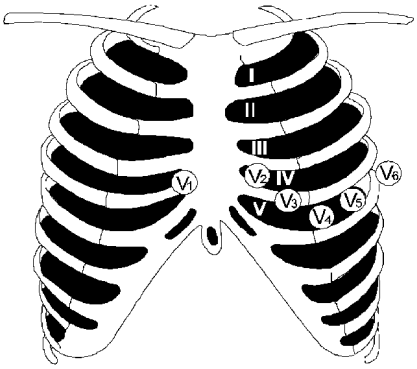
- the skin should be warm and the patient relaxed
- before fastening the electrode cleanse the skin with alcohol
- apply sufficient layer of gel on the electrode

It is recommended to fasten the electrodes in the following order:

- first fasten the **N** electrode to the right leg
- then fasten the other limb electrodes **R**, **L**, **F**
- finally fasten the chest electrodes in the following order: **V4 – V2 – V1 – V3 – V6 – V5**

The following two parts of this document contain the detailed description of the electrodes position.

3.3.1 Limb Electrodes



R – red - right arm
L – yellow - left arm
F – green - left leg
N – black - right leg

3.3.2 Chest Electrodes

V1 – red - the fourth intercostal space to the right from the sternum
V2 – yellow - the fourth intercostal space to the left from the sternum
V3 – green - in the middle between V2 and V4
V4 – brown - the fifth intercostal space in the MDCL line
V5 – black - at the level of V4 in the front axillary line, evenly between V4 and V6
V6 – violet - at the level of V4 in the central axillary line

3.4 EXAMINATION PROCESS

- Switch on the equipment by the **on/off** button:

- To enter the name of the patient to be printed in the record press the button: (optional)
- Select the print profile – e.g. **auto**:

- Fasten the electrodes to the patient's body. Make sure that all leads are properly connected and that ECG does not report any loose leads; possibly check if the signal on the display is clear.
- If everything is OK press the **print** button to start printing:

  (If in the automat mode the check of leads is ON in the profile, the device waits for fastening of electrodes and starts recording only when contact of all electrodes is OK)

3.4.1 Examination in the Automat Profile

Process of examination:
***SWITCH ON** the unit using the **on/off** button – **FASTEN THE ELECTRODES** – **SELECT PROFILE** using the **auto** button (Unit Setup) – **START RECORDING** using the **print** button – **AUTOMATIC TERMINATION**.*

Before start of recording check and possibly modify the following parameters (**cannot** be changed during recording):

- paper speed - the **mm/s** button
- sensitivity - the **mm/mV** button
- number of leads - the **number of leads** button
- leads required to be printed - the **select leads** button
- set the required filers using the **filter** and **drift** buttons.

Press the **print** button. The device starts recording of the ECG signal and printing of the curves on the thermo-sensitive paper; at the same time, the signal is stored in the records database.

Examination will be automatically terminated after the time set in the profile elapses; it also can be interrupted at any time by the **stop** button.

If printing of diagnosis and table of analysis is not set but you still want to print it, press the **analyse** button (only the types with DIAGNOSTICS).

If you want to print the record again set the print options using the keyboard and then press the **copy** button.

To perform automatic recording of another patient press the **print** button.

3.4.2 Examination in the Manual Profile

Process of examination:
***SWITCH ON** the unit – **FASTEN THE ELECTRODES** – **SELECT PROFILE** using the **man** button (Unit Setup) – **START RECORDING** using the **print** button – **TERMINATE** or **INTERRUPT** recording using the **stop** button.*

Before start of recording check and possibly modify the following parameters (it is also possible to change them during recording):

- paper speed - the **mm/s** button
- sensitivity - the **mm/mV** button
- number of leads - the **number of leads** button
- leads required to be printed - the **select leads** button
- set the required filers using the **filter** and **drift** buttons.

Press the **print** button. The device starts printing of the curves on the thermo-sensitive paper.

To terminate recording press the **stop** button.

To print record of another patient press the **print** button.

Note:
In the **manual** mode the data of the ECG signal are not stored in the records database.

3.4.3 Examination in the Print Screen Profile

Process of examination:
***SWITCH ON** the unit – **FASTEN THE ELECTRODES – START RECORDING** using the **print screen** button – **AUTOMATIC TERMINATION** or **INTERRUPTION** by the **stop** button.*

The process is very similar to that in the **automat** mode – see Chapter **Examination in the Automat Profile**.

3.4.4 Examination in the User Profiles

Process of examination:
***SWITCH ON** the unit – **FASTEN THE ELECTRODES – SELECT PROFILE** using the **man** button (Unit Setup) – **START RECORDING** using the **print** button – **AUTOMATIC TERMINATION** or **INTERRUPTION** by the **stop** button.*

Further process of examination is very similar to that in the **automat** resp. **manual** mode – see Chapter **Examination in the Automat Profile** or **Examination in the Manual Profile**.

3.4.5 Examination in the Long Profile

Process of examination:
***SWITCH ON** the unit – **FASTEN THE ELECTRODES – SELECT PROFILE OF THE long TYPE** using the **man** button (Unit Setup) – **START RECORDING** using the **print** button – **AUTOMATIC TERMINATION** or **INTERRUPTION** by the **stop** button.*

Further process of examination is very similar to that in the **automat** mode – see Chapter **Examination in the Automat Profile**.

3.5 RELIABILITY OF MEASURING AND DIAGNOSTICS

Parameters that are analysed on the basis of an averaged heart cycle are considered correct if the relevant record is not distorted too much by the mains noise, by artefacts of myopotentials, or by other noises. Another factor for reliability is that the unit correctly recognises the key points of the P-QRS-T complex. The accuracy of parameters may be also affected by inclusion of aberrant cycles to the averaged cycle in case that the unit incorrectly classifies them as typical for the given record. The unit attempts to determine the parameters of every record automatically; therefore it is necessary to ensure that at least three cycles typical for the record analysis are correctly averaged and that the number of aberrant cycles does not exceed the number of non-aberrant ones.

3.6 USE OF FILTERS

Fully automatic adaptive filter (adaptive auto) – a filter which performs permanent analysis of the recorded signal and on the basis of the acquired data filters the signal so as to achieve the optimum result. This filter comprises all other filters, therefore it CANNOT be combined with other filters.

Adaptive filter of mains noise (50 Hz-60 Hz) – a filter designed for reduction of the noise that penetrates the record from the mains, with the ability of adaptation to the changes in the frequency of the noise. Harmonic (sinus) waveform with a period of approximately 1 mm at the record speed of 50 mm/sec is typical for this type of noise. The filter does not affect any of the diagnostically important parameters of the record. "Adaptive" means that the filter can automatically adapt to both mains frequencies 50Hz and 60Hz. For faster stabilization of the filter it is recommended to set the correct value according to the current mains in **menu-unit setup-user setup-more…-mains frequency**.

Muscular filter 35 Hz – a filter with cut-off frequency 35 Hz designed for removing of muscular artefacts. This noise is characterised by non-harmonic waveform with short random period. This filter removes the mains noise as well. In certain cases this filter may affect some values of the amplitude of the QRS complex.

Muscular filter 25 Hz – a filter with cut-off frequency 25 Hz designed for removing of muscular artefacts. This noise is characterised by non-harmonic waveform with short random period. This filter removes the mains noise as well. Use of this filter is recommended in limited cases when muscular artefacts considerably distort the record. This filter may affect some values of the amplitudes of the QRS complex.

Anti Drift System – base line: – filters for removing of the base-line drift. Use these filters in cases when the base-line drift in the recorded examination is significant. Follow this scheme: As the starting filter always use the filter with the longest time constant – ADS 3.2 sec. If the base-line drift is significant and the ECG record escapes from the record (or from the display), switch the ADS filter successively to the filters with faster reaction, i.e. with shorter time constant. That is, from the original value ADS 3.2 sec towards the value of 0.1 sec. However, the value ‘heart rate x time of reaction of the filter‘ should always be much more than 10, so that the record is not significantly influenced. When using these filters with fast reaction (small number in the filter's name – 0.1 sec) it is necessary to keep in mind that filtration may in some cases result in some distortion of the P-QRS-T intervals. This is especially true for the diagnostically important S-T interval.

Filter ADS 3.2 sec is a standard filter for ECG recording and is recommended for use. Generally it is recommended to try to get as-good-as-possible record and limit use of all filters to minimum.

All the stated filters can be mutually combined so that the filtration of the record is optimum.

4 SETUP MODE

4.1 MAIN MENU

To enter this menu, press the button **menu** in the lead monitoring mode. The menu can be also entered using the touch screen: After touching the display at any point there appear the top and bottom toolbars. After pressing the **menu** button (in the lower right corner) there opens the main menu. Here you can select from the following options:

- Record Database
- Unit Setup
- Profile Setup
- Select Physician
- Displayed Leads

4.1.1 Record Database

This menu enables to open, view and print the last taken records. The records are stored in the memory automatically. If the memory is full, the next taken record overwrites the oldest stored record. The records which are marked as **archive** (**mark** button, a + sign is displayed in front of the record) are not overwritten and remain in the memory permanently (if you want to delete them, you have to do it manually).
With the selected record you can perform the following actions:

- reprint the record with the setting which it was recorded with, or with any other setting
- change the print profile
- view the record on the display, including analysis
- mark/unmark the record as archive
- delete the record
- display the record optionally sorted according to the attribute archive, date, name or ID
- export the selected record, current record or all records to the PC or fax (to receive data from the unit the PC must be equipped with the registered BTL-08 Win or BTL-08 Ergo software. The unit must be connected to the PC or modem by a cable). Data are transferred via the selected transfer channel, see Chapter **Export Setup**.

Note:
The records are stored in the memory in compressed format, so that there can be stored as many records as possible. That is why at first entering the archive the device has to convert these records into readable format. This operation may take several seconds, depending on the number of the stored records.

4.1.2 Unit Setup

This submenu includes the following options:

- select profile which the device starts with after switch-on (**starting profile**)
- set maximum heart rate alarm (**max. heart rate**)
- switch on / off acoustic signalling of the QRS complex (**QRS acoustic signal**)
- set the lead from which the device determines the heart rhythm (**rhythm lead**)
- set the ECG-signal print line width (**line width**)
- select information to be displayed in the patient card (**patient card setup**)
- set optional patient data (**optional patient data**)
- set the print parameters and the used paper type (**setting of paper and print**)
- set the parameters of export of the stored records to PC (**export setup**)
- enter another user setup menu of the device (**user setup**)

4.1.2.1 Starting Profile

Here you can select the profile that will be automatically set after switching the equipment on by the **on/off** button.

4.1.2.2 Max. Heart Rate

Here you can set the heart rate value which the equipment will consider the highest allowed. If the measured heart rate is higher than this set value the equipment makes warning by high intermittent beeping. If this maximum heart rate value is set to zero – **0** – the function is disabled.

4.1.2.3 QRS Acoustic Signal

Here you can enable/disable the acoustic signalling of QRS complex of the ECG-curve.

4.1.2.4 Rhythm Lead

Here you can set from which lead the device will determine the heart rate. In most cases it is not necessary to change the default settings, in special cases the lead can be changed (e.g. in some types of ergometric examination).

4.1.2.5 Line Width

Here you can set width of the ECG-curve printed on the paper. The setting shall be refined according to the used paper. This setting influences only the printing of the ECG-curve itself, not the printing of other information (texts, grids, pictures). Using this setting, together with setting of the suitable paper sensitivity (see above) it is possible to achieve the optimum appearance of the print.

4.1.2.6 Patient Card Setup

The enabled items appear during entering the patient data and can be filled in. The data are stored with the patient.
In the patient card you can enable the following items:

- name
- surname
- third name
- ID
- age
- sex
- weight
- blood pressure
- height
- pacemaker
- 2 user-defined items, the meaning and description of which can be set in **Optional Patient Data**.

4.1.2.7 Optional Patient Data

Here you can define names of two optional items of the patient card – e.g. *diagnosis, general state...*

4.1.2.8 Setting of Paper and Print

Here it is possible to set many important parameters of printing: if the print paper is perforated or for fax, if the grid shall be printed, paper sensitivity, and it is also possible to get the paper inserted after its replacement.
Setting of paper sensitivity is important for optimum printing, and besides the line width it influences the print quality the most. For details on paper settings see Chapter **Printer and Paper.**

4.1.2.9 Export Setup

Here you can select which of the available transfer channels will be used for export of data to the PC or fax. At the same time it is possible to configure the channel. In most cases the default setting is sufficient. Data are transferred from the unit to the BTL-08 Win or BTL-08 Ergo program. The selected communication channel will be used in the **export** option in the Record database, see **Record Database**.

4.1.2.9.1 Transfer: Serial Cable->BTL08

When exporting data to the PC via the cable, no special setting is necessary. The connection speed is 115200baud. The BTL08Win/Ergo program must be running on the PC and the receiving form must be open.

4.1.2.9.2 Transfer: Modem->BTL08

When exporting via the phone line, a modem or a mobile phone equipped with a hardware modem must be connected to the ECG.

Write in the **init string** box the initialization text string for putting the modem into the required mode. For details on individual commands in the initialization string see the User's Guide of the modem. The default settings work with most of the standardly sold modems.
The **dial string** box contains the phone number of the called telephone. Enter the phone number including the test string at the beginning: ATDT for tone dialling (new exchanges and mobile phones) ATDP for pulse dialling (older exchanges).

Example: for calling the number 2 333 555 84 using the tone dialling enter ATDT233355584.

4.1.2.10 User Setup

4.1.2.10.1 Date / Time

Setting of date and time in the device. This date and time are stored and printed together with the records. The device remembers the set date and time even if it is unplugged from the mains and the accumulators are low.

4.1.2.10.2 Display Contrast

Here it is possible to set the required display contrast. The function is the same as after pressing the **contrast** button in the on-line screen. For setting of contrast use the arrow buttons on the touch screen or on the keyboard.
Note:
At the colour display, the change of contrast may lead to change of the colour representation of the current colour scheme.

4.1.2.10.3 Select Language

Setting of the language in which the equipment communicates. The change of language does not occur before restart of the equipment.

4.1.2.10.4 Touch Panel Calibration

If after touching of the touch screen there react other display buttons than required, it is necessary to calibrate the touch panel. The process of calibration is described on the display - follow the instructions. For calibration use the touch-pen.
If calibration does not proceed successfully you can interrupt it at any time by pressing **esc**.
For check of the result of calibration use the **touch panel function test** function.

4.1.2.10.5 Repair of Files

If the stored data are corrupt because of interference or a device fault, there may appear errors in the file system (loss of some records, loss of some of the stored patients). This function starts diagnostics of the file system and tries to repair the fault without loss of the stored data, if possible. Depending on the amount of the stored data, this function can take a very long time (hours), therefore we recommend running this function e.g. overnight. If this function is run, it is necessary to wait until it is complete or to **reset** the device - see Chapter **Functions of the Keyboard Buttons**.

4.1.2.10.6 File System Formatting

This function initializes the entire file system, i.e. it deletes all data stored in device and puts the device into the initialized state (i.e. the same state as at purchase of the device). This function should be used only in case of a serious breakdown or if the user wants to initialize the device completely.

4.1.2.10.7 Default Setting - No User Data Loss

This function puts the device into the same state as at purchase (setting of language, colours, etc.) and at the same time it keeps all stored data of profiles, patients, physicians and records.

4.1.2.10.8 Sleep Mode Interval

Here you can set the time of inactivity after which the equipment switches off.

4.1.2.10.9 Battery Status Indication

Here you can enable/disable the acoustic signalling of low battery (short fast beeping). The visual indication cannot be disabled.

4.1.2.10.10 Demo

Here you can switch on/off the demo mode of the signal recording. If the Demo mode is on, the device behaves as if it were connected to the patient, although it is not. The Demo mode is indicated by bold letterings DEMO on the on-line screen as well as on the printed record.

4.1.2.10.11 More...

This button opens additional items of the user setup.

4.1.2.10.12 Unit Information

In this item all key information about the unit configuration is listed: serial number, firmware version, until when the function of the device is limited, version of diagnostics, temperature of individual parts of the device, version of firmware of the print module and configuration of the HW key. This information will be needed in case of communication with the sales department.

4.1.2.10.13 Information about Filesystem

This item contains some important information about the filesystems in the device. It serves only for service purpose.

4.1.2.10.14 Setting of Filter 50 Hz / 60 Hz

Setting according to the mains frequency. The applied mains filter retunes automatically according to the actual mains interference frequency. This setting sets the initial frequency on which the mains interference is looked for and thus shortens the response time of the mains filter.

4.1.2.10.15 Setting of HW Key

The device can be configured remotely. For example, if you decide to buy the DIAGNOSTICS upgrade later, the manufacturer (distributor) sends you the 64-digit code (so called **HW key**) which you enter here and the device reconfigures according to the entered key. For determination of the current HW configuration see **Unit Information**.

4.1.2.10.16 Password Setting

To prevent unauthorized handling of the device, it is possible to activate the password request after the switch-on. Here it is possible to enable/disable the password request and/or change password. The password is a numeric string of any length. If you forget your password, you can always use the string **00000000.**

4.1.2.10.17 Unlock Code

If the time of operation of the device is limited (e.g. by 12 October 2004), after this date the work with the device will be disabled. In this item it is possible to enter the code for "unlocking" of the device. To check if the device function is limited see **Unit Information**. For the unlock code contact the manufacturer or your distributor.

4.1.2.10.18 Colour Schemes and Colours of Leads

These options are active only in the colour device (model LC). They enable to change the colour representation of the display. Several colour schemes are factory-preset; in addition it is possible to create, edit and delete the user colour schemes. You can also assign a colour to each displayed lead and element.

4.1.2.10.19 Fast Data Processing

Here you can set the speed of the data processing algorithm for data recording in modes derived from the **automat** mode. Fast processing significantly reduces the time elapsing from pressing the **start** button till completion of data processing and the following printing. In some isolated cases, slow processing may lead to better results. We recommend keeping this option on, which considerably speeds up the routine operation of the device.

4.1.2.10.20 Automat Profile Print Speed

The speed of resulting printing in the profiles derived from the automat profile is always constant and independent of setting of the recording speed. This option enables to change the basic speed. **Middle** speed is 25mm/s and provides high-quality print on most of the paper types. When using better paper it is possible to set **higher** speed (50mm/s) and thus speeds up the routine operation of the device. In isolated cases (e.g. if worse paper is used) it is possible to set **lower** speed (10mm/s).
This setting applies only for the **automat** modes and does not influence the print speed in the **manual** mode.

4.1.3 Profile Setup

Here you can set options of all print profiles, including the default profiles **automat**, **manual** and **print screen**. It is possible to add any number of additional user profiles of type manual, automat or long. It is possible to edit the existing profiles and possibly delete them (except for the default profiles that cannot be deleted)

4.1.3.1 Setting Auto, Man, Print Screen Profile Parameters

For each profile you can set the following parameters:

- profile name (**name**)
- profile type (manual, automat) (**type**)
- sensitivity (**sensitivity**)
- paper feed speed (**paper speed**)
- used filters (**select filters**)
- length of the printed and saved record (**rec. duration**) (only for the automat type profile)
- select if the record will be printed or only saved in the memory (**printed**)
- print options: (**print setup**)
    - number of leads printed on the page
    - length of printing of the records (only for the automat type and print screen type profiles)
    - leads to be printed (only for the manual type profile)
    - enable/disable the check of loose leads before the start of printing (only for the automat type profile)
    - enable/disable printing of V-leads with half sensitivity
    - data to be printed in the header of the record
    - set the time of start of printing (only for the automat and print screen type profiles) - the start time of the record may be up to 10 seconds before pressing the "print" button, i.e. -10s. If you want to record the signal starting with the moment of pressing the "print" button, set the start time of recording to 0.
    - preview (displaying of the resulting print report on the screen)
    - set averaging and analysis of signal (only for the automat type profile and if the device is equipped with the DIAGNOSTICS module)
        - print leads averaging yes / no
        - print 10 seconds of rhythm
        - print analysis
        - print verbal interpretation
        - setting of type of interpretation: verbal / code
        - print everything on one page – averages, analysis and interpretation
        - averages in the upper / lower half of the page (in case of printing everything on one page)

4.1.3.2 Setting Parameters of Long Type Profiles

The long type profile (long record) enables to record and save in the equipment's memory a signal from any one or two leads of a length of up to 10 minutes. The setting is similar as with other profile types. Averaging and analysis are not possible. It is only possible to select printing of the heart rate histogram.
For each profile you can set the following parameters:

- profile name (**name**)
- profile type (long) (**type**)
- sensitivity (**sensitivity**)
- paper feed speed (**paper speed**)
- used filters (**select filters**)
- length of the printed and saved record (**rec. duration**)
- data to be printed in the header of the record (**header print setup**)
- print of the HR histogram yes / no (**histogram**)
- number of recorded and printed leads (**number of leads**)
- recorded and printed leads (**lead 1** and **lead 2**)

4.1.4 Select Patient

The equipment provides the database of patients, in which it is possible to enter, edit and delete the patients. The new patient can be also entered in the on-line mode by pressing the **patient** button. The data to be entered in the patient card can be set in the unit setup, see **Patient Card Setup**. The number of patients is limited only by the capacity of the equipment's memory
The information about the patient is printed in the header of the record according to the profile setup.
The saved patients remain in the memory even after switching the equipment off. The set current patient always sets to "blank" after switch-on.

4.1.5 Displayed Leads

Here it is possible to configure displaying of the leads on the on-line screen. it is possible to change the arrangement of displaying as well as which signals shall be displayed in the individual windows – the **select leads** button. The device remembers the setting even after being switched off. To overwrite the setting press the **mode** button.

4.1.6 Select Physician

The equipment provides the database of physicians, in which it is possible to enter, edit and delete the physicians. The number of physicians is limited only by the capacity of the equipment's memory.
The information about the physician is printed in the footer of the record according to the profile setup.
The saved physicians remain in the memory even after switching the equipment off. The set current physician always sets to "blank" after switch-on.

5 ACCESSORIES AND UPGRADE

5.1 ACCESSORIES

The equipment is not designed for use in connection with other accessories and other medical devices except those stated in this Manual.
The lists in the following chapters include all accessories that can be supplied.
For details on particular accessories see the enclosed leaflet.

BTL accessories:

- mains cable
- limb electrodes (EKK)
- chest electrodes (EPP)
- self-adhesive electrodes
- thermo-sensitive paper - for fax (with grid / without grid)
- thermo-sensitive paper - perforated
- touch-pen
- spare fuse
- BTL patient cable, type C008.108
- BTL patient cable for the self-adhesive electrodes, type C008.109
- User's Manual
- suction cup electrodes set
- software BTL-08 Win
- software BTL-08 Win Ergo
- software BTL-08 ECG Modem – ecgmodem.exe

5.2 UPGRADE

The basic version of a BTL-08Lx ECG Series device is an n-channel electrocardiograph without diagnostic interpretation of the measured data. If you decide to upgrade the capabilities of your device by automatic diagnostics you can add the Diagnostics module which enables to get and print the following items:

- **table of analysis results** time intervals, amplitudes of segments, electric axes and heart rate
- **verbal interpretation** draft interpretation of the measured results
- **leads averaging** with indication of complexes in the record
- **10 seconds of rhythm** course of rhythm and analysis
- **pacemaker** measuring and marking of pulses emitted by the pacemaker

To check if the DIAGNOSTICS module is implemented, check **menu-unit setup-more…-unit information**.

6 EQUIPMENT MAINTENANCE AND SAFETY

The service inspection including measuring of all parameters of the device and possible recalibration must be performed in intervals shorter than 30 months. The inspection and recalibration is performed by the authorized BTL service department on the basis of the user's order. If the inspection is not done in the stated term the manufacturer does not guarantee the technical parameters and safe operation of the product.

Keep the device clean, do not store or use it for a long time in enormously dusty environment and do not sink it in any liquid. Before each use check if the equipment and its accessories (especially cables) are not mechanically or otherwise damaged. Do not use the equipment if it is damaged!

Cleaning of the equipment's surface and of its parts:
For cleaning of the equipment and its parts use only a soft cloth slightly moistened by water or by 2 % solution of detergent. Do not use agents containing alcohol, ammonia, benzine, thinners, etc.
For cleaning of the equipment do not use abrasive materials so as to prevent damage of the equipment's surface.

Once every 6 months wipe the dirt and dust from the sensors of paper by a fine brush. The sensors are located under the printer cover at the upper edge of the device (two black boxes) and they are accessible after removal of the printer cover from the device.

No part of the equipment needs to be aseptic or sterilized.

Cleaning of accessories which come into contact with the patient (e.g. electrodes):
We recommend cleaning these parts after treating of each patient. For cleaning use agents which were approved by the competent health officer (e.g. Sekusept, Bacilol, Incidur spray for the accessory cables, and the like).

Replacement of fuse
The fuse is located in the round black box (**21**) on the rear panel. Before replacement make sure that the mains switch (**20**) is in the "**0**" position and unplug the mains cable from the unit. Turn the segment of the fuse box to the left by a fitting screwdriver or coin and put the fuse out. Insert new fuse and turn the box to the right. **It is forbidden to insert a fuse with another indication than stated on the label at the fuse box.**
This action may only be done by a person acquainted with this procedure.

Transport and Storage
We recommend keeping the packing of the equipment. For transport it is suitable to pack the equipment in this packing which ensures its maximum protection. Unplug the mains cable and the accessories cables. Avoid big shocks. The equipment shall be stored/transported only on conditions defined in Chapter **Technical Parameters**.

The BTL-08Lx ECG Series devices are designed for use in connection with the defibrillator. The used defibrillator must comply with the Standard IEC 601-2-4 and its discharge must correspond to that which is described in the Standard IEC 601-2-25. The equipment is resistant to defibrillation only if the original BTL patient cable is used.

The examination couch for ECG recording should be placed as far as possible from interfering fields of mains (mind the mains cables in walls) and other possible sources of interference (electrical appliances, radios) so that the quality of the records is not affected by the noise. The conductive parts of the electrodes must not touch other conductive parts of the bed and the surroundings, nor the ground.

6.1 SAFETY

ATTENTION!

In the connector marked as above only the original BTL patient cable shall be connected, which is the only cable to ensure the resistance to defibrillation.
The applied part is of the CF type.

The clamp marked as above is connected with the equipment's frame. If the ECG signal is considerably interfered it is possible to connect the clamp to the potential of the patient ground – e.g. the metal frame of the bed.

Safety Precautions

- Before first switch-on of the equipment read carefully the User's Manual.
- All staff to use the equipment must be instructed of the way of operation, maintenance and checking of the equipment and of the safety principles of its use.
- The electrical cabling which the equipment will be connected to must be installed and tested according to the existing valid standards (IEC 364). If you are not sure that the mains are completely OK get them inspected by an inspection engineer.
- Check if the parameters of the mains correspond to the requirements of the equipment according to Chapter **Technical Parameters** and if the voltage switch located on the rear panel of the equipment is switched to the correct voltage according to the parameters of the mains.
- The equipment is designed for work in the environment defined in Chapter **Technical Parameters**. It must not be used in the environment which implies e.g. the danger of explosion or penetration of water into the equipment. The equipment must not be used in connection with inflammable anaesthetics or oxidizing fluids (O_2, N_2O, etc.).
- Do not place the equipment within the reach of sunshine and strong electromagnetic fields so as to prevent undesirable mutual influence. In case that this undesirable influence occurs, place the equipment more distant from the source of interference or contact the authorized BTL service department.
- Inspect the equipment thoroughly before each use (loose cables, broken insulation of cables, functions of display, pilot lights, controls, etc.); in case of any inconsistency stop using the equipment and contact the authorized BTL service department. If the equipment's behaviour differs from the function described in this Manual stop using the equipment and contact the authorized BTL service department.
- If the equipment shows any defect or if you have doubts about its correct function, terminate therapy immediately and disconnect the equipment from the patient. If you do not determine the source of uncertainty after thorough study of the Manual, contact the authorized BTL service department. If the equipment is used out of accord with this Manual or is used even if it shows functional differences from this Manual, the user will be responsible for the damages caused by the equipment.
- Do not dismantle the equipment in any case. Removal of protective covers implies the danger of electrical injury. Possible replacement of the lithium battery and the lead accumulator may only be done by the authorized BTL service department.
- All material and parts which come into direct contact with the patient's body (cleaners for the electrodes...) must comply with the respective standards related to irritability, allergization, toxicity, genotoxicity and carcinogeneity (ISO 10993-1, ISO 10993-3, ISO 10993-5). The user is responsible for all these materials and parts if not supplied by the BTL equipment vendor.
- The connectors for accessories as well as the other connectors must not be used for connection of anything else than they are designed for according to this Manual; otherwise there is a danger of electric shock injury and serious damage to the equipment.
- During operation of ECG make sure that the conductive parts of electrodes, including the N electrode, and all other conductive patient applied parts do not touch other conductive parts in the office, nor the ground.
- The equipment does not use or produce any toxic substances during its operation, storage or transport under the stated conditions.
- After bringing the equipment from cold environment to the warmth do not plug it in the mains until the temperatures become equal (i.e. for at least 1 hour).
- The time interval between switching the equipment off and on must be at least 3 seconds.
- This equipment does not imply any danger for the patients with pacemakers.
- The equipment is resistant to the defibrillation pulse. It resumes recording the signal after 10 seconds. For this purpose use only the original BTL cable.

- Do not touch the equipment during the defibrillation discharge.
- If after many years of operation it is necessary to discard the equipment it can be done in a way which is usual for this type of devices after removal of the lithium battery and the lead accumulator. The batteries must be disposed of in a proper way – not within the municipal waste. The equipment does not contain any toxic materials which could harm the environment in case of normal way of liquidation.
- This type of electrocardiograph is not designed for on-line monitoring of ECG signal during the work with high-frequency surgical devices. It must not be connected to the patient if a high-frequency surgical device is connected to him/her.
- This type of electrocardiograph is not designed for on-line monitoring of ECG signal in workplaces connected to life support (ICU, operating rooms, etc.)
- Owing to possible risk which could result from simultaneous connection of more various devices to the patient (mutual influence, possible endangerment of the patient by summation of the leaking currents) we do not recommend to use this electrocardiograph in connection with other devices than stated in this User's Manual.
- The equipment and the accessories must not be used in a way out of accord with this User's Manual.
- During work with this equipment use the recommended protective means.
- Keep the equipment out of reach of children.
- The equipment does not contain any components which could be repaired by the user. Do not remove any covers from the equipment. All repairs should be done by the authorized BTL service department.

6.2 USEFUL ADDRESSES

The product is manufactured in accordance with the EU Medical Devices Directive by :

BTL Industries Ltd.
Suite 401 Albany House
324-326 Regents Street
London, W1B 3BL United Kingdom
E-mail: sales@btlnet.com
http://www.btlnet.com

For service, please contact service department at service@btlnet.com.

6.3 WARRANTY

The Manufacturer of this product warrants the product to be free from defects in workmanship and material for a period of twelve months after the date of shipment from the factory. This warranty excludes any disposable items and accessories, including, but not limited to cables or leads, power cords and electrodes. The manufacturer agrees to correct such defects without charge, or at its option to replace the item with a comparable model. To register and be eligible for warranty service, you must send or fax the fully completed warranty registration form within 30 days of installation. All costs of shipment are the responsibility of the purchaser. Damage to any part such as by accident or misuse or improper installation or by use of any accessories or abrasive material not produced by the Manufacturer is not covered by this warranty. Because of varying climatic conditions, this warranty does not cover any changes in finish, including rusting, pitting, corrosion, tarnishing or peeling. Servicing performed by unauthorized persons render this warranty invalid. There is no other express warranty. The Manufacturer hereby disclaims any and all warranties, including but not limited to, those of merchantability and fitness for a particular purpose to the extent permitted by law. The duration of any implied warranty which cannot be disclaimed is limited to the time period as specified in the express warranty. The Manufacturer shall not be liable for incidental, consequential, or special damages arising out of, or in connection with product use or performance except as may be otherwise accorded by law.

This warranty may differ from the warranty terms and conditions provided by your supplier and by applicable laws in your country.

7 TECHNICAL PARAMETERS

Type:	BTL-08 LT ECG	BTL-08 LC ECG
Display:	touch screen	touch screen
dimensions (mm):	120 x 89	171 x 128
resolution:	320 x 240	640 x 480
Keyboard:	combined functions touch-panel	combined characters touch-panel
Indication of discharged battery:	acoustic, pilot light	
Check of loose leads:	yes, individual leads	
Paper width (mm):	210	
Paper type:	for fax, perforated	
Print type:	thermal	
Print speed (mm/s):	5;10;25;50	
Sensitivity (mm/mV):	2.5;5;10;20	
Number of leads:	12	
Number of channels:	12	
Number of displayed leads:	12	
Measured leads:	I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6	
Electrode set:	R, L, F, N, C1, C2, C3, C4, C5, C6	
Number of printed leads:		
auto mode:	3, 4, 6, 12, 6x2+1, 3x4+2	
manual mode:	3, 4, 6, 12	
long mode:	2	
Length of record:		
auto mode (seconds):	10;20;30;40;50;60;70;80	
long mode (minutes):	1;2;3;4;5;6;7;8;9;10	
Record in auto mode:	synchro	
Saved 10-second-long records:	120	
Filters:		
automatic	adaptive auto	
mains filter (Hz):	50 / 60	
muscular filters (Hz):	25;35	
base-line filters (s)	3.2; 1.5; 0.6; 0.3; 0.1	
Detection of pacemaker:	yes	yes
Diagnostics:	optional	optional
User profiles:		
of automat type:	unlimited	
of manual type:	unlimited	
of long type:	unlimited	
Weight (max.):	5.7 kg	5.9 kg
Dimensions (l x w x h) [mm]:	407x312x125	
Operating conditions:		
temperature:	+ 10 °C to + 40 °C	
relative humidity:	30 % to 75 %	
atmospheric pressure:	700 hPa to 1060 hPa	
position:	horizontal – on legs	
operation type:	continuous	
Transport and storage conditions:		
temperature:	- 10 °C to + 55 °C	
relative humidity:	25 % to 85 %	
atmospheric pressure:	650 hPa to 1100 hPa	
position:	any	
max. duration of storage:	1 year	
other conditions:	transport only in the supplied packaging recharge the accumulators at least once per year	

Type:	BTL-08 LT ECG	BTL-08 LC ECG
Power supply:		
input:	100 VA	100 VA
mains voltage:	~ 100 V to 230 V (115 / 230 V nominal), alternating	
frequency:	50 Hz to 60 Hz	
protection class:	II (according to IEC 536)	
external fuse:	T2A / 250V, tube fuse 5 x 20 mm, acc. to IEC 127-2	
mains switch:	on the rear panel, positions 0 and I	
covering grade:	IP20	
Internal chemical sources:		
battery:	lithium battery CR2032	
lead accumulator:	2x 12 V / 1.2 Ah, maintenance-free	
accumulator capacity:	2-3 hours of ordinary use, approximately 35 meters of continuous printing	
charger:	internal, time for 100 % charging approx. 6 hours	
Input impedance:	> 20 MΩ	
CMMR:	> 100 dB	
Sampling frequency:	2 000 Hz	
long mode, one lead	18 000 Hz	
long mode, two leads	9 000 Hz	
Frequency range (filters off):		
for +10% / -30 %	0.04 Hz – 150 Hz	
for +10% / -10 %	0.67 Hz – 40 Hz	
Amplitude accuracy:	± 2 %	
Time accuracy:	± 2 %	
Quantization noise:	3.9 µV	
Input noise:	< 8 µV	
A/D converter resolution:	13 bit	
Max. range of input voltage:	AC: ± 15.9 mV; DC: ± 400 mV	
Applied part:	CF type	

Applicable Standards:

Name	IEC, EN, ISO, MDD
Medical electrical equipment Part 1: General requirements for safety	IEC 601-1
Amendments to IEC 601-1	A2, A11 a A12
Medical electrical equipment Part 1: General requirements for safety 1.Collateral standard: Safety requirements for medical electrical systems	IEC 60601-1-1
Medical electrical equipment Part 1: General requirements for safety 2. Collateral Standard: Electromagnetic compatibility. Requirements and tests	IEC 601-1-2
Industrial, scientific and medical (ISM) radio-frequency equipment - Radio disturbance characteristics - Limits and methods of measurement	EN 55011
Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 2: Electrostatic discharge immunity test - Basic EMC Publication	IEC 61000-4-2
Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 3: Radiated, radio frequency, electromagnetic field immunity test	IEC 61000-4-3
Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4: Electrical fast transients/burst immunity test - Basic EMC Publication	IEC 61000-4-4
Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 5: Surge immunity test	IEC 61000-4-5
Medical electrical equipment Part 1: General requirements for safety 4.Collateral standard: Programmable electrical medical systems	IEC 601-1-4
Medical devices - Risk analysis	EN 1441
Biological evaluation of medical devices - Part 1: Evaluation and testing	ISO 10 993-1
The Medical Devices Directive 93/42/EEC	MDD 93/42/EEC
Medical electrical equipment - Part 2: Particular requirements for safety of electrocardiographs	IEC 601-2-25
Amendment to IEC 601-2-25	A1

This product is manufactured in accordance with the EU Medical Devices Directive by:

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TROUBLE - SHOOTING

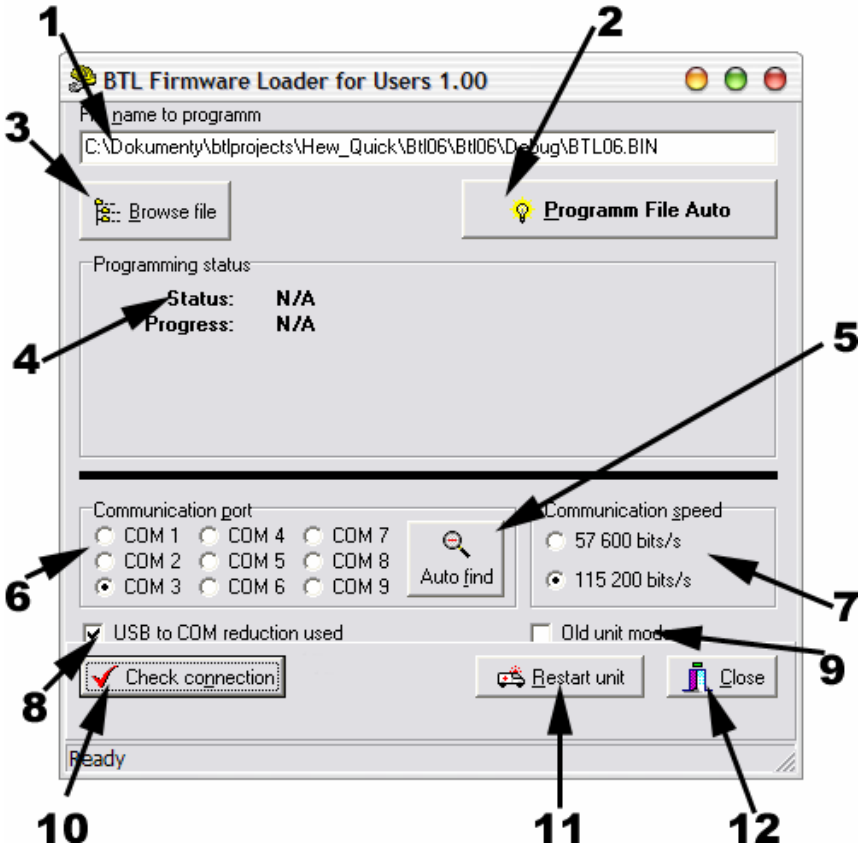
Fault	Description of fault	Reason of fault	Solution / Remedy
it is not possible to switch device on	there are no pilot lights or device immediately switches off	power failure	switch on the I/O rocker switch on the rear panel of the device
			check the mains supply and connection into the wall outlet
			check fuse
			replace battery
		electronic failure	carry out the reset of device
			check the internal link cable between CPU and Power board
			measure the voltage on the Power board
	device switches off after a few seconds	discharged battery, power failure	see "power failure"
		defective keyboard	change keyboard
device switches off	device switches off after a certain period	function of automatic switching off the device is set	modify unit setting in the menu according to your needs
		discharged battery, power failure	see "power failure"
printing is not working properly	printer pilot light is shining	paper fault	add paper
			check insertion of paper
			clean the paper sensor
		printer failure	check the locking lever / closed printer cover
	printing stops or device switches off	discharged battery, power failure	see "power failure"
	blank paper is coming out from the printer	discharged battery, power failure	see "power failure"
		unsuitable paper	check the correct paper orientation
			use only BTL original thermosensitive paper
	printing subsequently gets weaker	unsuitable paper	see "power failure"
			use only BTL original thermosensitive paper
	poorly visible printing	print setting	set the width of line in the menu of device
			modify the setting of paper sensitivity in the menu of device
	straight dashed lines are printed	loose leads	check connection of electrodes
			use ECG gel
			set pacemaker YES on Patient card setting
			replace the patient cable with a new one
	there are empty places in printing	unclean printer	clean the printer head
		defective printer	change the printer
device does not respond	"wait please" message is shining on the screen for a longer time than 5 min.	program fault	carry out the reset of device
communication is not working	export data fault	wrong setting	set the type of communication to serial export
			check the setting and port functionality of PC
		HW fault	check the connection of communication cable in the device and PC
			connect to another PC port
			replace the communication cable (USB adapter)
touch-panel is not working properly	the place of pressing is out of the touch place	calibration fault	carry out touch panel calibration
	device does not respond to touching	calibration fault	carry out touch panel calibration
		defective touch panel	replace touch panel
it is not possible to acquire the record	device displays loose lead	defective lead	see "loose leads"
	straight dashed lines are printed	defective lead	see "loose leads"

Process of upload of application from PC by serial line – for end users

needed equipment and tools

- program equipment "FirmwareLoaderMini.exe" version 4.00 or higher - hereinafter "FirmwareLoader"
- serial loading cable
- PC with MS Windows operating system and a serial port (it is possible to use a USB-COM adapter)

controls of FirmwareLoader



1 … path and name of the file with new firmware
2 … button for starting of upload of new firmware
3 … button for searching for a file with new firmware
4 … process of upload of new firmware
5 … button for automatic searching
6 … selection of communication port
7 … setting of communication speed
8 … cancelled
9 … cancelled
10 … button for check of correct connection of the device to PC
11 … button for restart of the device
12 … button for termination of the FirmwareLoader program

process of upload

Switch the device off by the mains switch (rocker switch on the rear panel). Connect the mains cable to the device and switch on the mains switch. Then switch the device on by longer holding of the ON/OFF button on the front panel. After a

while there should appear the opening screen of the application. If the device contains the proper version of the application, do not continue. Depending on the ECG type, the version of application can be found out as follows:

08LT, 08LC - from the initial title on the start-up screen (OS SP2001, **ver XX.XX.XXXX**)
08MT - from the initial title on the start-up screen (OS SP2001, **ver XX.XX.XXXX**)
08MD, 08SD - from the initial title on the start-up screen (**ver XXXX**) or from the Unit Setup menu – SW Version
08S - press key „restart“ during switching unit on – information will be printed out on paper

connection to PC

Connect the loading cable to the rs232 connector on the rear panel. The other end of the cable connect to the serial port of the PC – it is also possible to use the USB-COM adapter.

Activation buttons for individual ECG types:

08LT, 08LC - AUTO + FILTER
08MT, 08MD - AUTO + FILTER
08SD - AUTO + MONITOR LEADS
08S - AUTO + STOP

Switch the device off by the ON/OFF button and then by the mains switch. After a while press simultaneously the activation buttons and when holding them pressed switch the device on by the mains switch. The display should remain dark and after some 4 seconds the device should play a short tune – then you can release the buttons. Now the device is in the mode for upload of firmware by external serial line.

Start the "FirmwareLoader" program on the PC.

We recommend setting the communication speed to 115200 bit/s (7).

Set the correct communication port (6) and communication speed (7). It is possible to use the "Auto find" function (5) which will try to find the device in all available serial ports. (Note: In some types of computer this function may not work reliably.)

Check the connection with the device by the "Check connection" button (10). If everything works OK, the dialog box with the message "Unit present" must appear after pressing this button. If there appears the message "Unit not found", the computer cannot connect to the device for a reason – it is necessary to find out why, try to repeat the previous steps with other communication speed, check the cable, etc.

Note:
If the program does not find the device on the first try, it is suitable to press the "Check connection" button (10) for several more times – the device could respond later.

loading of firmware

!!! ATTENTION !!!
Loading of firmware is a very delicate process which under certain conditions can disable work with the device. The loading program is designed to minimize the possibility of an error; however, some risk still remains. Therefore it is recommended that you have some experience with computers before performing this action.

Do not switch the device and/or the PC during loading – incorrectly loaded firmware could cause locking of the device (this status could require even a servicing intervention of the manufacturer).

During loading do not move the window with the running application in the Windows environment, otherwise there is a risk of a programming error – in such case restart programming.

Press the "Browse file" button (3) with a directory tree symbol to select the file with the application to be loaded to the device. The selected file is displayed in the upper field (1). The program remembers the last setting.

Press the "Program file auto" button (2) to start loading of the program to the device. First there is detected configuration of the device and consistency of the loaded file. This part is indicated by the message "Reading unit information…" (4). If any

incompatibilities or other problems are found, there appears an error message with description of the error. These errors are usually caused by incorrect or corrupted input file – in such case it is necessary to get a new file.

After this test the process of loading is started – it is indicated by the message "Programming…" (4). If any problem appears during programming, an error message is displayed. During loading the program informs about the current percentage status of completion. If an error occurs during programming, do not switch the device off and restart programming. If the error repeats, contact the service department.

If programming passed OK, there appears the dialog box "Complete OK". Now you can reset and disconnect the device.

reset and disconnection of the device

If this work is complete, disconnect the device by pressing the "Restart unit" button (11). The device restarts and then the PC disconnects from it. After restart of the device there should appear the standard opening screen of the application and it is possible to standardly work with the device. To check that the new version of firmware is loaded in the device, see the "unit information" menu item or the opening screen.

Process of upload of application from PC by serial line – for service

Application shall be loaded into the assembled equipment containing an application or the program loader.

needed equipment and tools

- program equipment "FirmwareLoaderService.exe" version 4.00 or higher - hereinafter "FirmwareLoader"
- serial loading cable
- PC with operating system and a COM port (it is possible to use a USB-COM adapter)

process of upload

Switch the device off by the mains switch (rocker switch on the rear panel). Connect the mains cable to the device and switch on the mains switch. Then switch the device on by longer holding of the ON/OFF button on the front panel. After a while there should appear the opening screen of the application. If the device contains the proper version of the application, do not continue. Depending on the ECG type, the version of application can be found out as follows:

08LT, 08LC	- from the initial title on the start-up screen (OS SP2001, **ver XX.XX.XXXX**)
08MT	- from the initial title on the start-up screen (OS SP2001, **ver XX.XX.XXXX**)
08MD, 08SD	- from the initial title on the start-up screen (**ver XXXX**) or from the Unit Setup menu – SW Version
08S	- press key „restart“ during switching unit on – information will be printed out on paper

If the device contains only the program loader the display does not show anything, but the device remains in the ON status.

If the device contains different type or version of the application, use the same process.

connection to PC

Connect the loading cable to the rs232 connector on the rear panel. The other end of the cable connect to the serial port of the PC – it is also possible to use the USB-COM adapter.

Activation buttons for individual ECG types:

08LT, 08LC	- AUTO + FILTER
08MT, 08MD	- AUTO + FILTER
08SD	- AUTO + MONITOR LEADS
08S	- AUTO + STOP

Switch the device off by the ON/OFF button and then by the mains switch. After a while press simultaneously the activation buttons and when holding them pressed switch the device on by the mains switch. The display should remain dark and after some 4 seconds the device should play a short tune – then you can release the buttons. Now the device is in the mode for upload of firmware by external serial line.

Start the "FirmwareLoader" program on the PC.
We recommend setting the communication speed to 115200 bit/s.
The version of the loader can be found out after loading of HW Info (see below). If you are not sure you can leave this item checked off, the loading will work even with the new devices, but it will be slower.
Set the proper communication port ("Settings" tab) and communication rate. It is possible to use the "Auto find" function which will try to find the device in all available serial ports (only the ports really connected to the computer are displayed).

To check the connection with the device at any time press the "Check connection" button in the program. If everything works OK, the dialog box with the message "Unit present" must appear then.

If there appears the message "Unit not found", the computer cannot connect to the device for a reason – it is necessary to find out why, try to repeat the previous steps with other communication rate, check the cable, etc.

unit HW Info

Switch over to the "Unit info" tab and press the "Reload" button in the upper left corner of the window. The percentage status of communication should appear at the bottom of the window.
After a while a table in the program should list the hardware configuration of the tested device.
On the "Unit info" tab you can see the hardware configuration of the device. The key data are especially the version of the loader and the versions of particular printed circuits in the equipment. Unit info can be updated (reloaded from the device) at any time by pressing the "Reload" button.

loading of firmware

If the information in the Unit info is correct it is possible to start loading of firmware. Switch to the "Programming" tab.
Press the button with a directory tree symbol to select the file with the application to be loaded to the device (e.g. 070-56autoXXX.bin). The selected file is displayed in the upper field. The program remembers the last setting.

Press the "Program file auto" button to start the procedure which compares the selected file with data from the device – if the device is compatible, this procedure modifies the loaded file according to parameters read from the device and starts loading of the program to the device. If any problem occurs, there appears an error message with possible description of the error. During loading the program informs about the current percentage status of completion.

If programming passed OK, there appears the dialog box "Complete OK". Now you can reset and disconnect the device.

To abort programming press the "Abort action" button. However, after starting a device with incompletely loaded firmware there is a risk of its failure.

reset and disconnection of the device

If this work with the device is complete, disconnect it by pressing the "Restart unit" button. The device first restarts itself and then the PC disconnects from it.

Appendix

supplementary description and explanation

Loading is completely automatic, i.e. it is not necessary to check the versions in the device and the loaded file. The program automatically modifies itself according to the parameters read from the device – i.e., if the program finds out that the device contains another type of hardware than is set in the loaded file, the loaded file is internally modified before loading so that it corresponds to the configuration of the device. This automatic control is fully functional if there have not been any major hardware changes in the device. If there have been such changes, it is necessary to load the correct new configuration (i.e. file with the correct new hardware configuration) at least once to the device. A typical example is e.g. replacement of analog: in such case it is not possible to load the universal file to the device as usually, but at the first loading after the replacement it is necessary to load to the device a specific file containing this change. Next loading works standardly with the automatic configuration.

It is possible to upload to several devices at the same time – their number is limited only by the number of COM ports on the PC. Each of these devices has its own FirmwareLoader session running.

During loading do not move the window with the running application in the Windows environment, otherwise there is a risk of a programming error – in such case restart programming.

BTL - 070

Instructions for Use

v100z1RK26/05/2003EN05/16CZ

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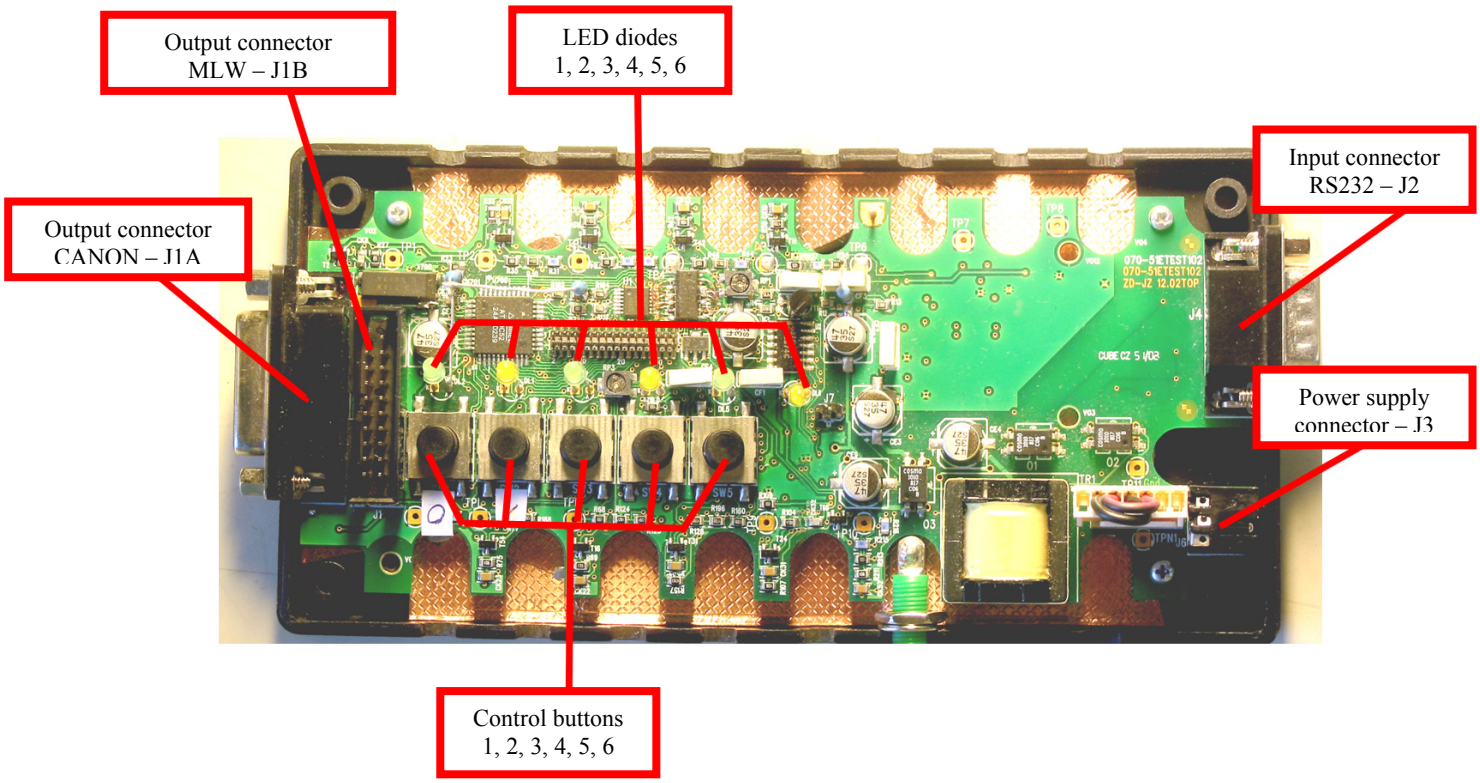
1 General Characteristics

EKG-Test is a tool for debugging and check of parameters of the analog board of ECG devices.

The tool can work either in automatic mode – controlled directly from the ECG device via the RS232 line – or in the manual mode, where the operator selects individual programs by the tool's buttons or using a program in the PC.

The tool is supplied from a small 9V plate battery which eliminates interference from the low-voltage mains. So as to spare the lifetime of the battery, the tool automatically switches off after approx. 10 minutes of inactivity.

2 Description:



- output connectors MLW (J1B) and CANON (J1A):
  emit test signals which are brought to the input (patient) connector of ECG. For an assembled ECG use connector CANNON and for testing of separate analog boards use connector MLW and a flat cable.

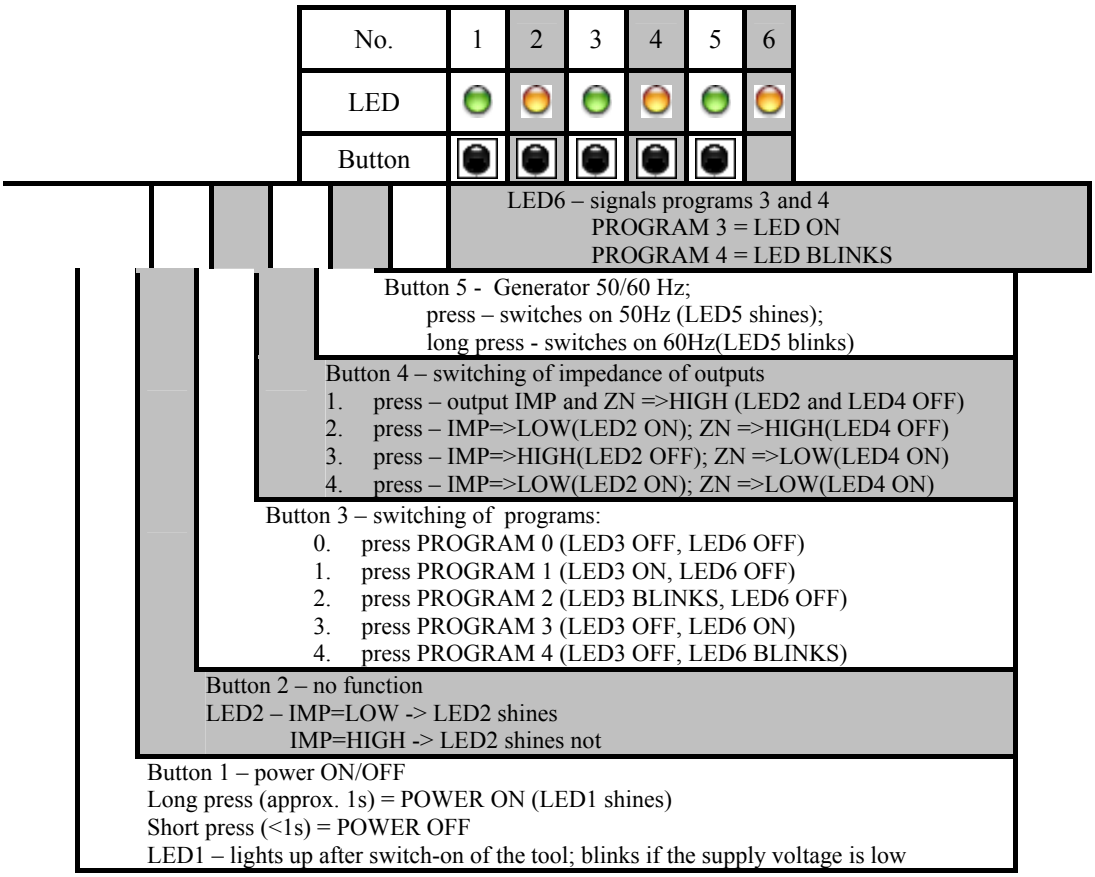
- input connector RS232 (J2)
  serves for connection of control line RS232 from the ECG or PC. By this line you can control the activity of the tool.

- LED diodes
  serve for signalling of the current state of the tool (see Control of the EKG Test Tool)

- control buttons
  serve for manual control of the tool (see Control of the EKG Test Tool)

- power supply connector (J3)
  serve for supply of voltage, standardly 9V (max. 15V)

3 Control of the EKG Test Tool:



4 Process of Measuring

4.1 Automatic Measuring

4.1.1 Connection

Connect the tool to the measured ECG: the output of the tool (either from connector J1A or from connector J1B) to the input (patient) connector, the RS23 output of the ECG connect with RS232 input of the tool (connector J2 on the tool). Connect the tool to supply voltage 9 - 12V.

4.1.2 Measuring

Enter the service mode on the ECG (see Chapter 6) and start automatic measuring of the analog board. The ECG device performs the needed tests and prints the result of measuring.

4.2 Manual Measuring

4.2.1 Connection

Connect the tool to the measured ECG: the output of the tool (either from connector J1A or from connector J1B) to the input (patient) connector. The RS232 input of the tool (connector J2) you can connect with the PC and then control the tool by a Windows program. Connect the tool to supply voltage 9 - 12V.

4.2.2 Measuring

Select the programs according to the process of debugging of the ECG analog board (either by the tool's buttons or by the PC program). Check the waveforms on the connected ECG device and compare them with the expected results (see Chapter 5, Description of Programs).

4.3 Connection of the Tool to individual types of ECG

In all types of ECG devices the output of the tool (J1A or J1B) is connected to the input (patient) connector of the ECG device. Then it is necessary to connect the tool to power supply (connector J3). Connection of the communication line differs according to the type of the RS232 connector in the ECG device.

4.3.1 Devices of S and SD Series

The RS232 connector on the devices of these series does not have power supply, therefore it is necessary to use the special supply adapter 170-CABLE. Plug this adapter in the RS232 connector of the ECG device and connect it with the tool by the extension cable RS232 (which serves a.o. for upload of firmware from PC to ECG). The adapter must be supplied from an 8-15V direct-voltage source (9V recommended). The polarity of the input voltage does not matter. At the same time the adapter provides crossover of the Rx and Tx signals of the RS232 line, therefore it is not possible to use the crossover cable RS232 for connection with the tool.

4.3.2 Devices of MT and MD Series

The RS232 connector on the devices of these series has power supply of output circuits, therefore it is possible to connect the tool directly using the crossover cable RS232 or by the adapter 170-CABLE and the non-crossover extension cable RS232 (which serves a.o. for upload of firmware from PC to ECG). **Do not supply the adapter.** When using the adapter it is not possible to use the crossover cable RS232 for connection with the tool, because the adapter provides crossover of the Rx and Tx signals of the RS232 line.

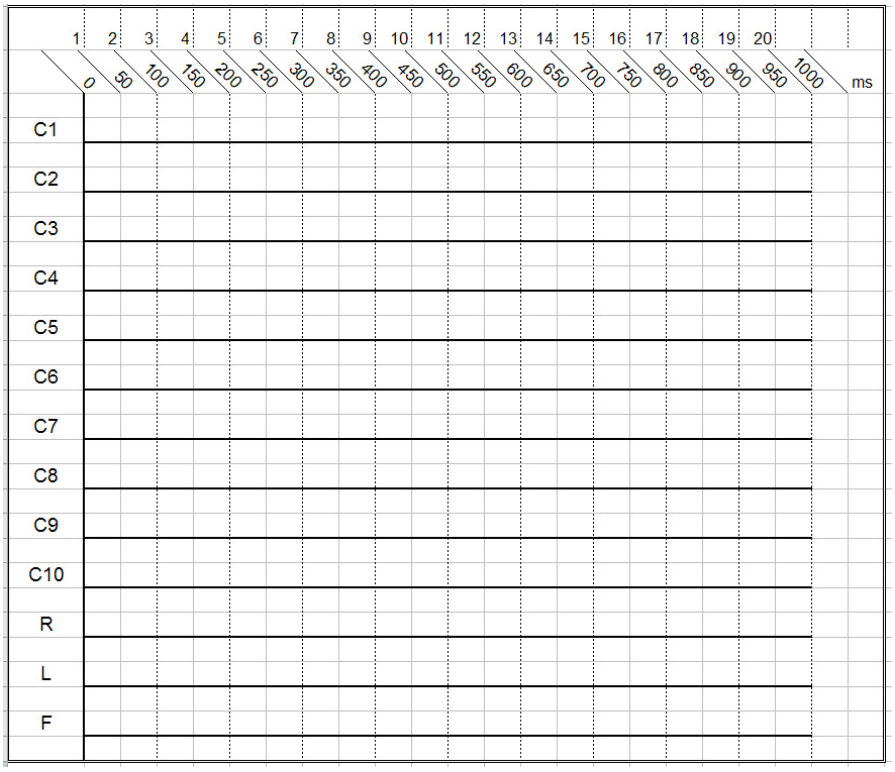
4.4 Technical Description of Connection of the RS232 Connector

All BTL – ECG devices have the RS 232 connector connected as crossover. This enables to connect this connector to PC by only the non-crossover extension cable RS232. Devices of S and SD series do not have the output circuits of the RS232 connector supplied.
The EKG-TEST tool has the RS 232 connector connected as crossover too.
Therefore, for connection of the tool to the ECG device it is necessary to use the crossover cable or the 170-CABLE adapter (which provides crossover) and the non-crossover extension cable RS232 (which serves standardly for upload of firmware from PC to ECG).

5 Description of Programs

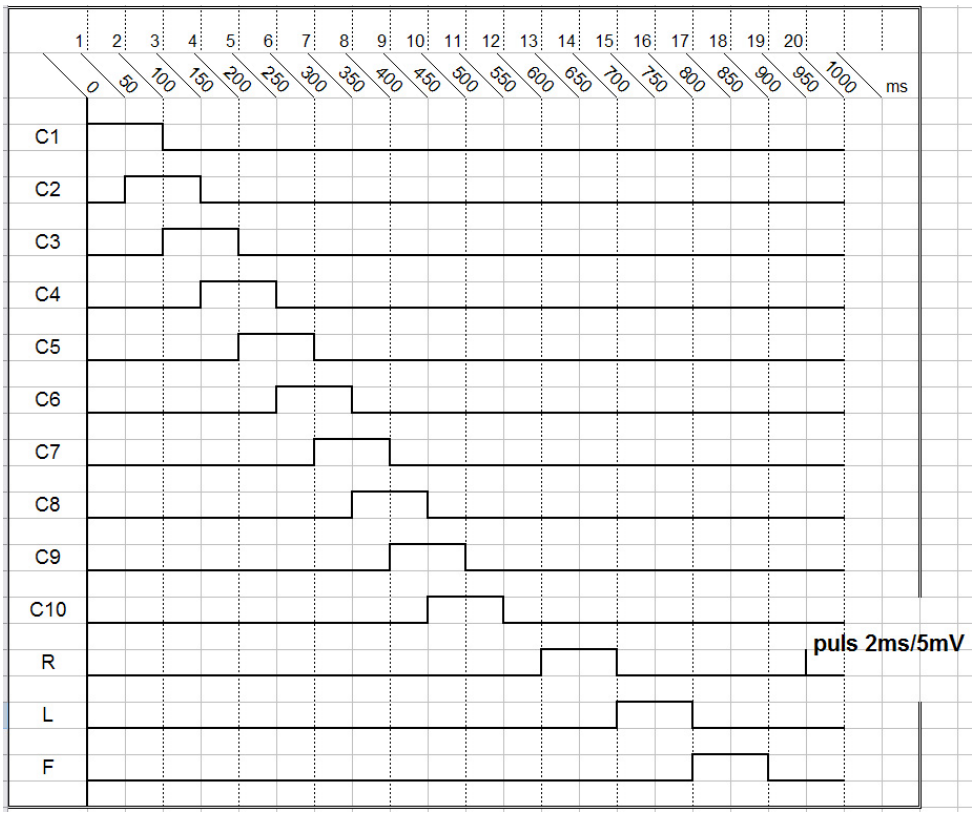
5.1 Program 0

Signalling: LED3 = OFF; LED6 = OFF
Waveform:



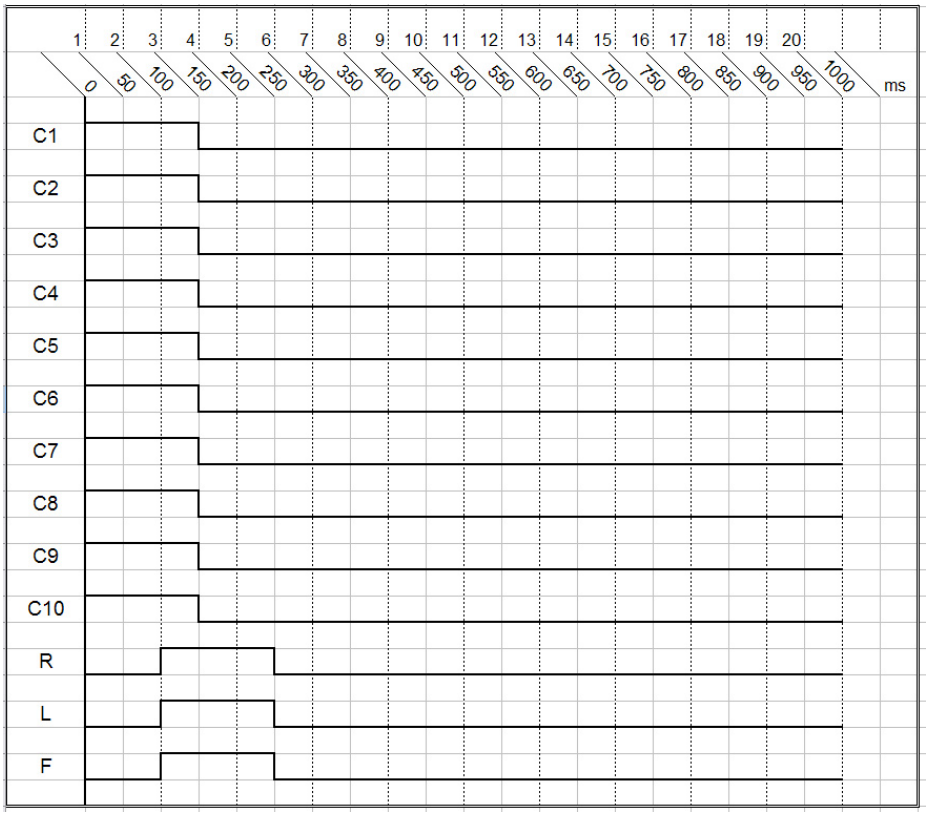
5.2 Program 1

Signalling: LED3 = ON; LED6 = OFF
Waveform:



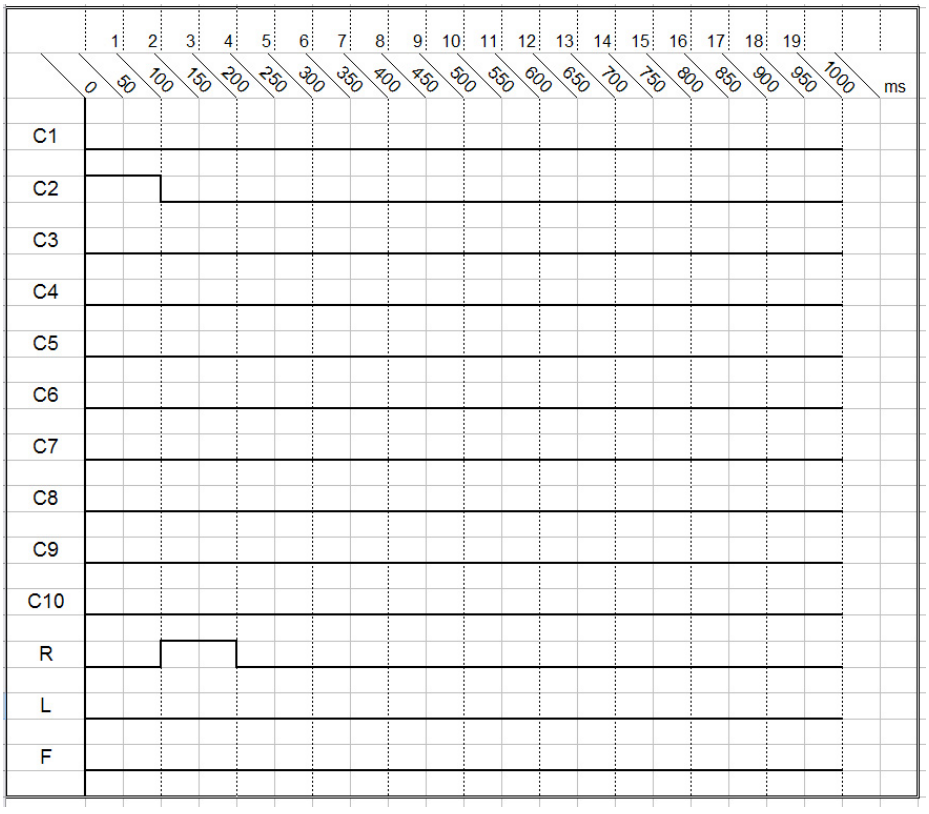
5.3 Program 2

Signalling: LED3 = BLINKS; LED6 = OFF
Waveform:



5.4 Program 3

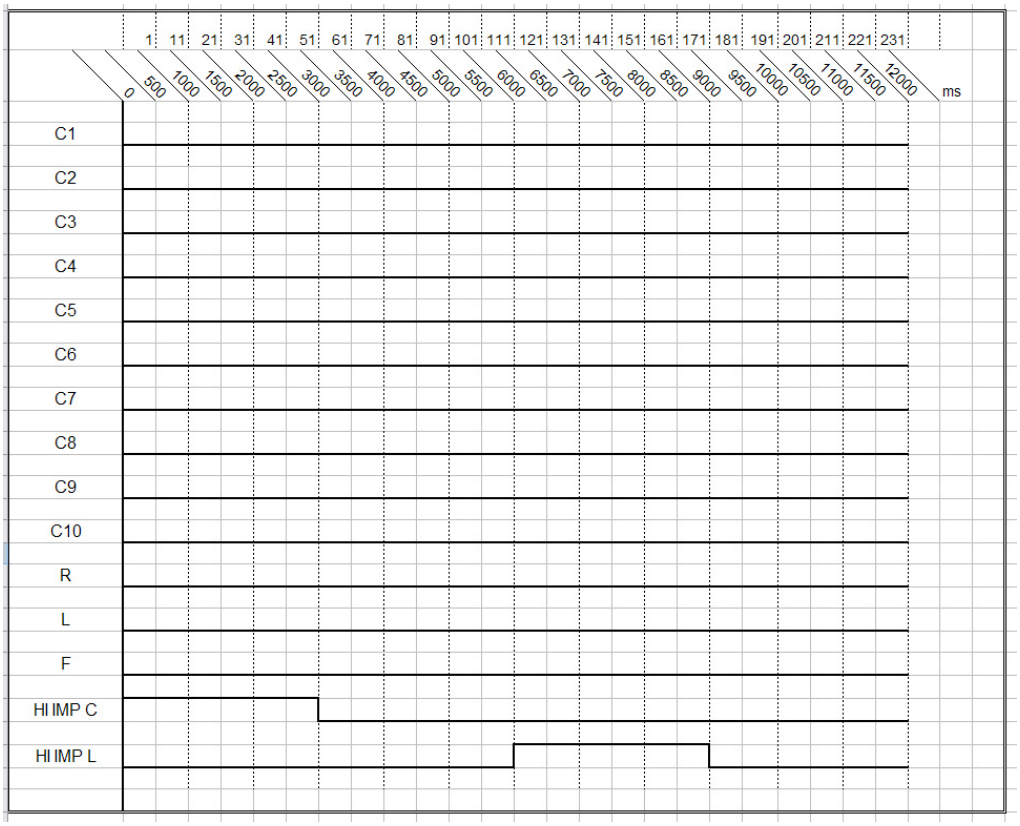
Signalling: LED3 = OFF; LED6 = ON
Waveform:



5.5 Program 4

Signalling: LED3 = OFF; LED6 = BLINKS

Waveform:



6 Starting of Service Mode in ECG Devices

The ECG devices have measuring subprograms implemented for automatic measuring. These subprograms control the EKG – Test tool by the RS232 serial line. The subprogram starts individual programs in the ECG Tester one after another and compares the measured values with the assumed ideal course. The ECG devices do not make any signalling during the testing, the duration of one test exceeds 4 minutes. At the end the ECG printer prints a test report.

6.1 Devices of S Series

Switch the main switch of the ECG device to 0. To start the test, press the "mm/mV" key and the "on/off" button. This will start all tests and in the end print the test report.

6.2 Devices of SD Series

The test is in Main menu –> Unit setup -> Factory setting -> Test of analog. The device enables to choose performing of a particular test or of all tests one by one. At entering the factory setting menu the device requires an entry password.

6.3 Devices of MD Series

The test is in Main menu –> Unit setup -> Factory setting -> Test of analog. The device enables to choose performing of a particular test or of all tests one by one. At entering the factory setting menu the device requires an entry password.

6.4 Devices of MT Series

Start the ECG device in the special service mode (at startup press the ENTER button and hold it pressed until the device announces start of the service mode). Then the device requires an entry password.
The test is in Unit setup -> Factory setting -> Test of analog. The device enables to choose performing of a particular test or of all tests one by one.

7 Description of built-in Tests

The ECG devices perform the tests automatically, either all tests one after another or a selected test separately (ECG devices of the S series can run only all tests). The duration of individual test can reach up to several minutes (during the test the device seems not to perform any activity).

7.1 Test 1 – Check of Gain and Skips

The test runs in two steps – at normal impedance and at high impedance. The evaluation of these steps is the same, only the lower and upper limits differ. First there is run the test at normal impedance, then at high impedance. At the high impedance the measuring is influenced by the environment, therefore it is necessary to prevent movement of people in a distance less than 1 m from the device during measuring.

A 1 mV pulse 250 ms long is generated successively on all leads at an interval of 250ms. The upper table contains amplitudes on all leads in individual steps. The amplitude of the 1mV pulse can be seen on the diagonal from left to right, from top to bottom. The measured values are in uV and are influenced by a DC offset. This table serves for an error analysis in case of unsuccessful evaluation of the test.

The lower table contains evaluation of the test for each lead separately. There are evaluated amplitudes of leads in reaction to 1 mV pulse. From these values the DC offset is already removed. For successful test, the amplitudes must be in the interval 900 – 1200 uV for normal impedance and 750 – 1200 uV for high impedance.

7.2 Test 2 – Check of Time Constant of ADS Filters

A 1mV pulse is generated on lead V1 at various values of the ADS filter and there is monitored the time after which the value of the signal drops to 0.386 of the maximum value. This measured time is the time constant of the filter. The table contains for all filters the measured value, the lower and upper limit and the test evaluation.

7.3 Test 3 – Check of Suppression of 50 (60) Hz In-Phase Interference

The 50 Hz interference is generated on the tool and the device's response to this interference is monitored. The maximum level of 50 Hz is measured on lead V2. The resulting value is converted to dB. For successful test the value must be at least 98 dB.

7.4 Test 4 – Check of Noise of the Input Amplifiers

The zero signal is received from the tool and its level on lead V2 is measured – this is the noise level. There is detected the maximum level of noise and the maximum level of the induced 50 Hz. The measuring is done at high impedance. It is necessary to prevent movement of people in a distance less than 1 m from the device during measuring. For successful test both values must not be higher than 0.2 mV.

7.5 Test 5 – Check of DC Deviation from the Zero Line of the Signal

The level of the signal is measured on each lead with the 50 Hz filter ON and the ADS filter OFF. The signal level before the HW ADS filter is displayed in the values of the converter, after the filter in uV. The maximum permitted deviation is 2 LSB before the filter and 250 uV after the filter.

7.6 Test 6 – Check of Signalling of Loose Leads

The chest leads, the R lead (interconnected with F) and the L lead are successively disconnected during the test. The DC level of the signal before the HW ADS filter is monitored. For the chest leads and lead III the limit of detection of a loose lead is +-8 LSB, for lead II it is +-2 LSB.

7.7 Description of Possible Faults

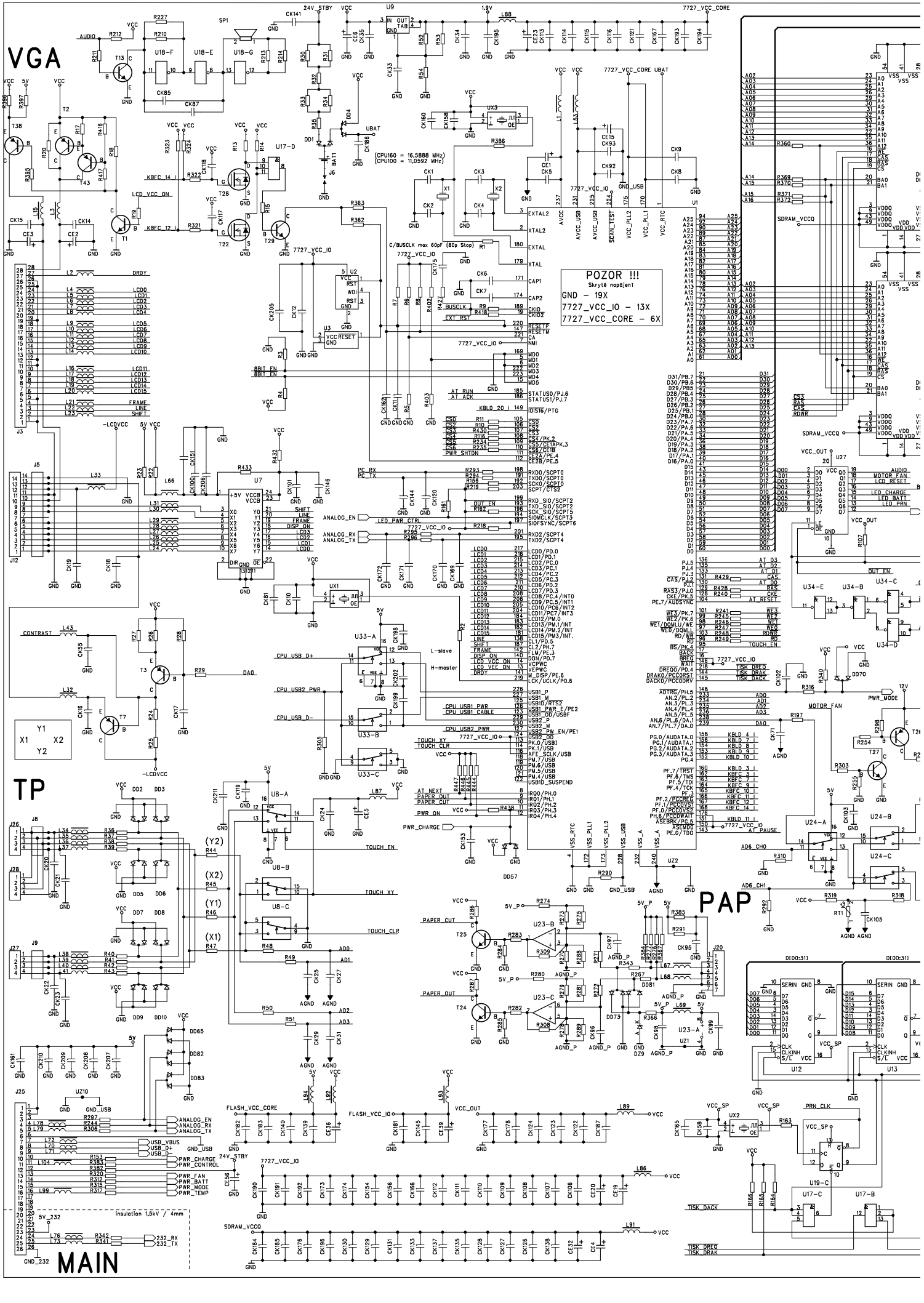
If programming of the uP on the board does not go well, check if points J1, J6 are disconnected and R14 not mounted. Then check quality of soldering of J3 and possibly solder it and repeat programming.

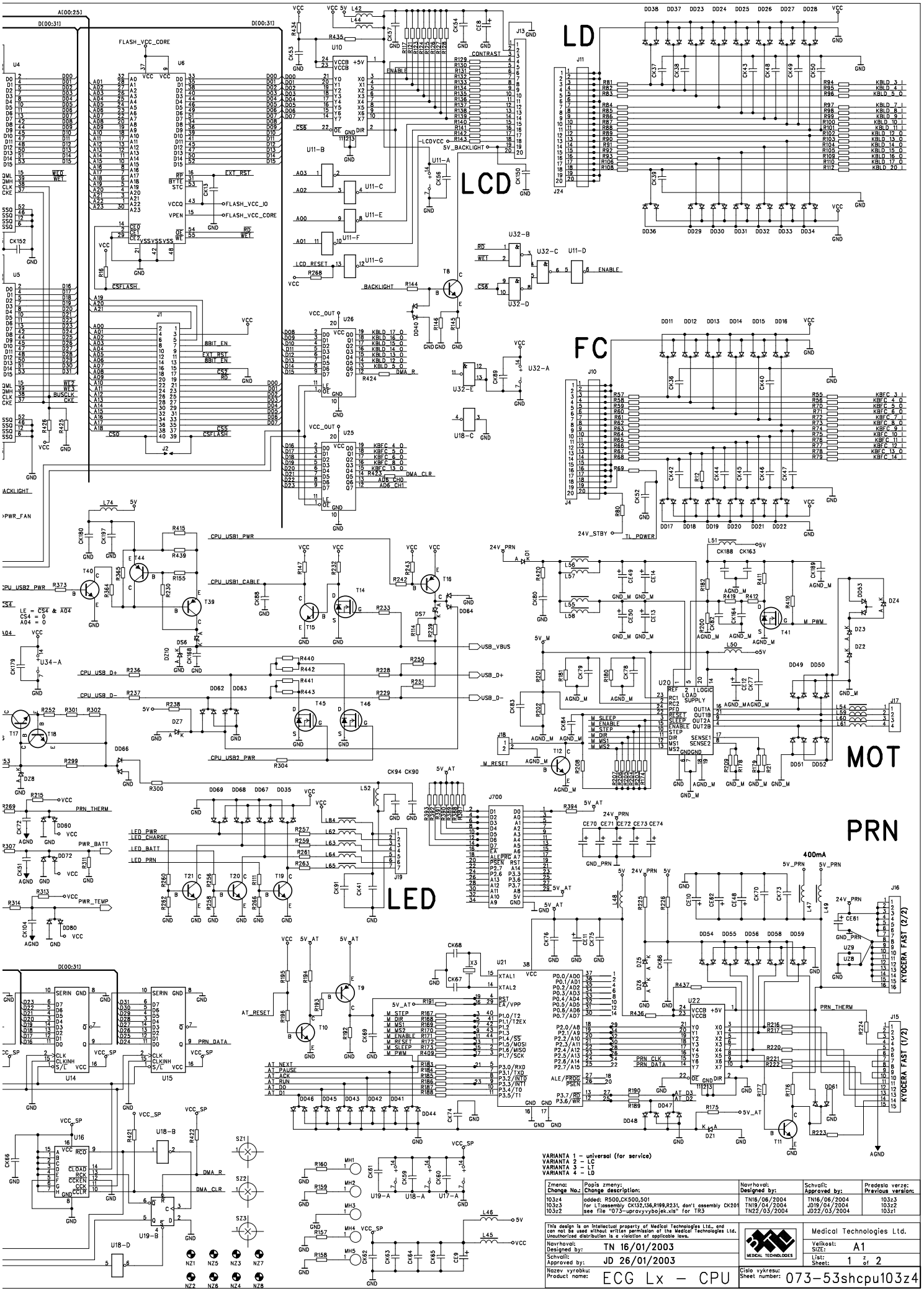
If LED diodes keep blinking, U701 (Watchdog) is probably incorrectly controlled, i.e. the board is not programmed or the SW version is wrong.

Low voltage on TP1 (+5VIN): the voltage converter does not oscillate, short-circuit on the TR output, etc.
Check by the oscilloscope the signal on the transformer input - approx. +-5V /35kHz (30-40kHz on collectors of T402 and T403) and on the transformer output - approx. +-10V (DD450, DD451, etc.).
Or check if TR2 is correctly mounted - according to the dashed outline, the upper right corner of TR2 is NC (pin 5 - no winding is connected to it).

Low voltage on TP4 and TP5 (+-7V) - same as above, and check voltage on L1 and L2 (drop max. 0.1V).

Low voltage on TP10 and TP11 (VV+ and VV- i.e. approx. +-7V). Check soldering on T13 or T14, respectively. The voltage on their bases is by max. 0.2V lower than on the collectors, so it corresponds to voltage on TP4 and TP5). If voltage on the bases is low (approx. +-1V towards GND and lower) check the size of R57 or R58, type of Zener diode DZ450 or DZ451. Or the transistors' emitters are short-circuited to the ground. If there is no short-circuit on the transistors, check the short-circuit current between the ground and TP4 or TP5, max. for 10 seconds. During measuring of the short-circuit current, the converter with a period of approx. 1 sec may switch on and off. At overload the stabilizer switches off the sources +5VIN. If the current is higher than 200mA, the converter with transformer TR1 (2) is OK. Short-circuit VOP+ or VOP-. If the short-circuit current is higher than 200mA, the connection with transistors T13 and T14 is probably OK and it will be necessary to look for the fault elsewhere - in increased consumption of operational amplifiers, etc.


VGA
TP
PAP
MAIN
POZOR !!!
Skrytě napájení
GND – 19X
7727_VCC_IO – 13X
7727_VCC_CORE – 6X
Insulation 1,5kV / 4mm



Zmena: Change No.:	Popis zmeny: Change description:	Navrhoval: Designed by:	Schválil: Approved by:	Predesla verze: Previous version:
103z4	added: R500,CK500,501	TN16/06/2004	TN16/06/2004	103z3
103z3	for LT:assembly CK132,136,R199,R231, don't assembly CK201	TN19/04/2004	JD19/04/2004	103z2
103z2	see file "073-upravyvybojek.xls" for TR3	TN22/03/2004	JD22/03/2004	103z1

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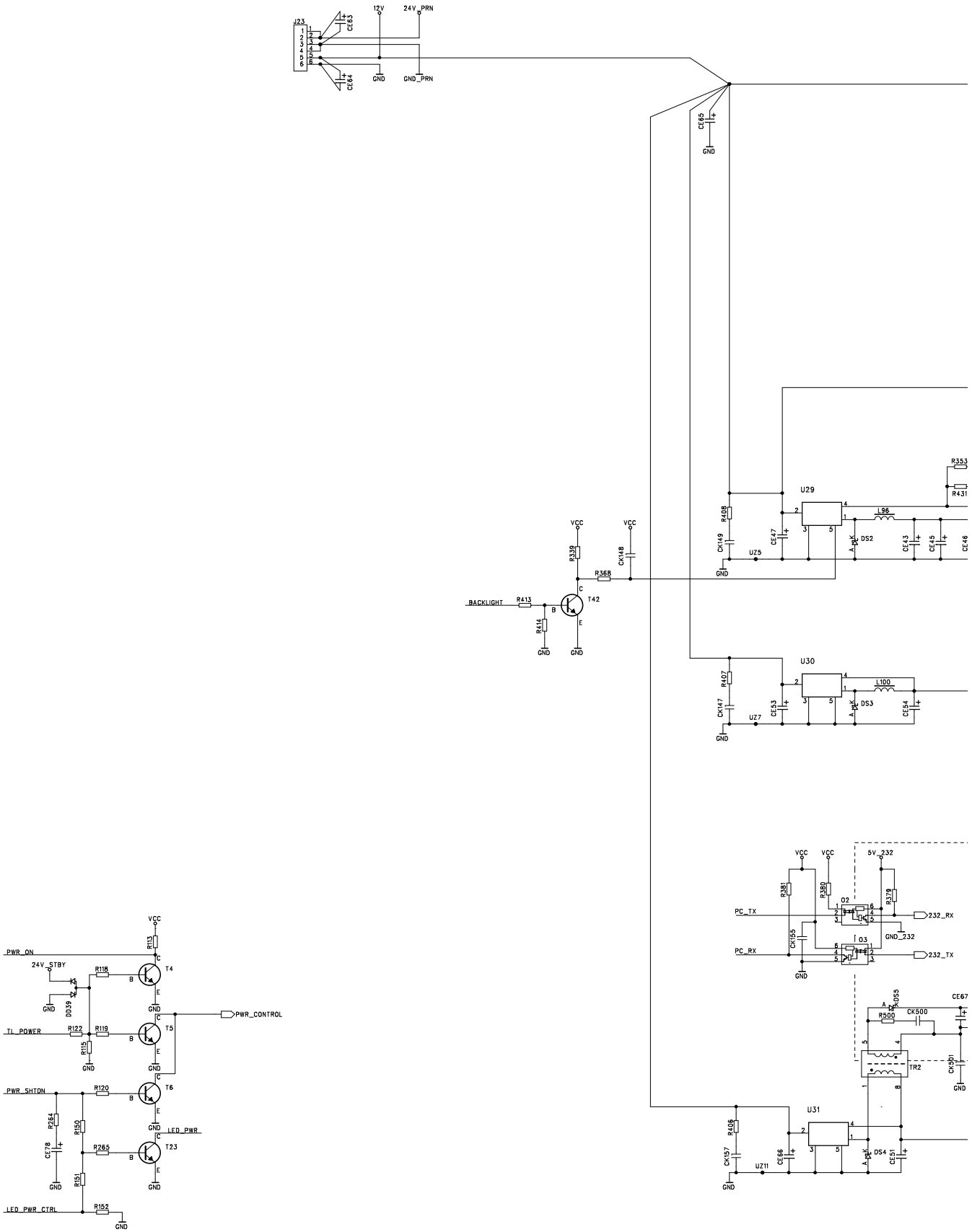
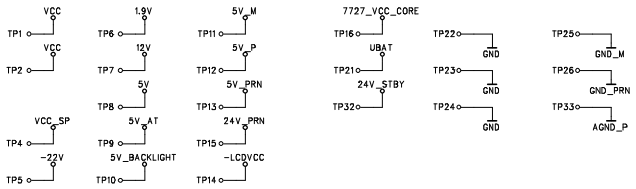
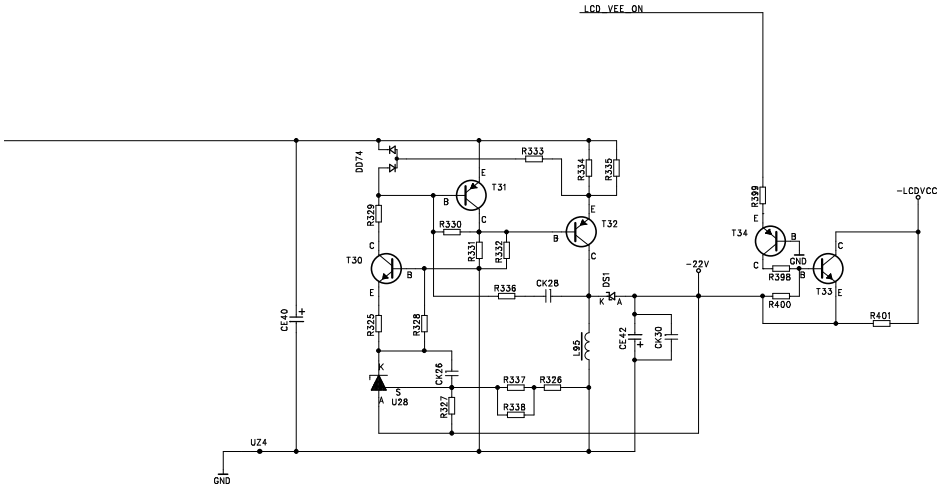
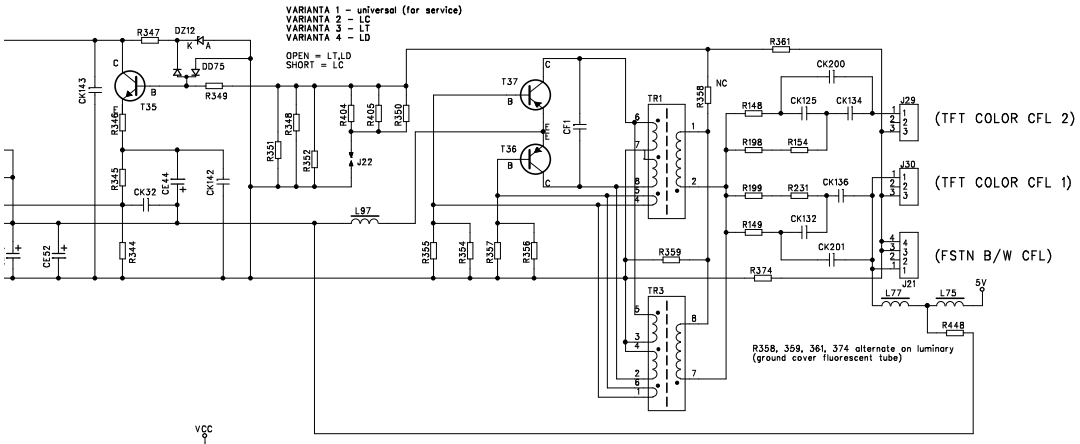
Schválil: Approved by:	JD 26/01/2003	Velikost: SIZE:	A1
Nazev vyrobku: Product name:	ECG Lx – CPU	List: Sheet:	1 z 2
		Cislo vykresu: Sheet number:	073-53shcpu103z4

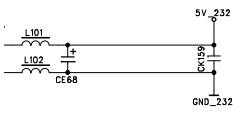

J23
CE63
CE64
12V
24V_PRN
GND
GND_PRN
CE65
GND
U29
R408
CK149
CE47
U25
DS2
CE43
CE45
CE46
L96
R353
R431
VCC
VCC
R339
CK148
R368
BACKLIGHT
R413
R414
T42
GND
GND
U30
R407
CK147
CE53
UZ7
DS3
CE54
L100
VCC
VCC
5V_232
R381
R380
R379
O2
PC_TX
232_RX
GND_232
CK155
O3
PC_RX
232_TX
GND
CE67
DS5
CK500
R500
TR2
CK501
GND
U31
R406
CK157
CE66
UZ11
DS4
CE51
GND
VCC
PWR_ON
R113
24V_STBY
R118
T4
GND
D39
GND
PWR_CONTROL
TI_POWER
R122
R119
T5
R115
GND
GND
PWR_SHTDN
R120
T6
R284
R150
GND
LED_PWR
CE78
R265
T23
R151
GND
GND
LED_PWR_CTRL
R152
GND

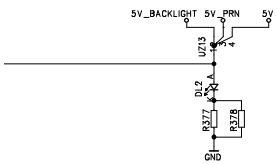






insulation 1,5kV / 4mm





Zmena: Change No.:	Popis zmeny: Change description:	Navrhoval: Designed by:	Schvalil: Approved by:	Predosla verze: Previous version:
103z4	added: R500,CK500,501	TN16/06/2004	TN16/06/2004	103z3
103z3	for LT:assembly CK132,136,R199,R231, don't assemblyCK201	TN19/04/2004	JD19/04/2004	103z2
103z2	see file "073-upravyvybojek.xls" for TR3	TN22/03/2004	JD22/03/2004	103z1

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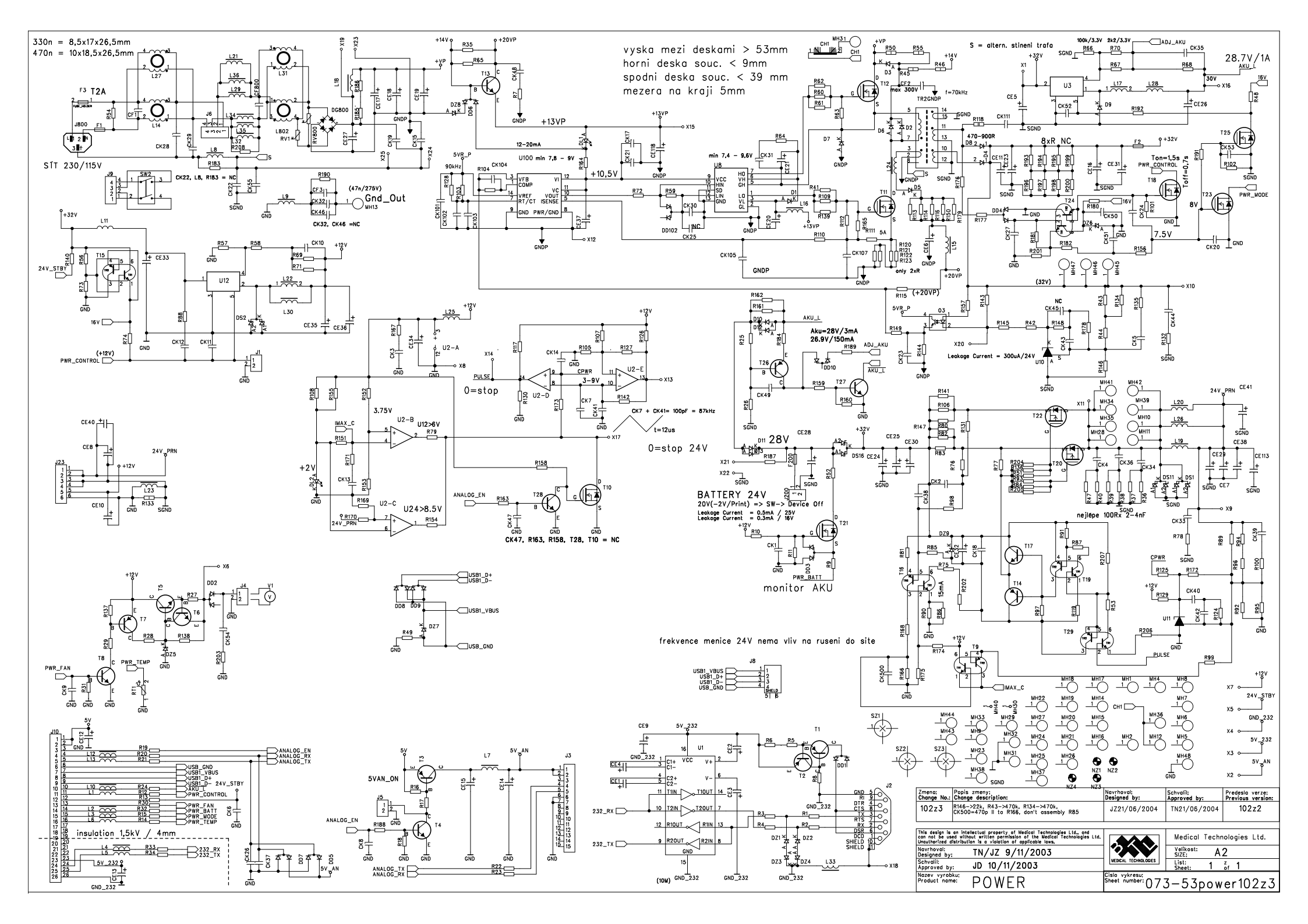
Schvalil: Approved by:	JD 26/01/2003	Velikost: SIZE:	A1
Nazev vyrobku: Product name:	ECG Lx - PWR	List: Sheet:	2 z 2
		Cislo vykresu: Sheet number:	073-53shcpu103z4



Zmena: Change No.:	Popis zmeny: Change description:	Navrhoval: Designed by:	Schválil: Approved by:	Predesla verze: Previous version:
102z3	R146->22k, R43->470k, R134->470k, CK500=470p ll to R166, don't assembly R85	JZ21/06/2004	TN21/06/2004	102z2

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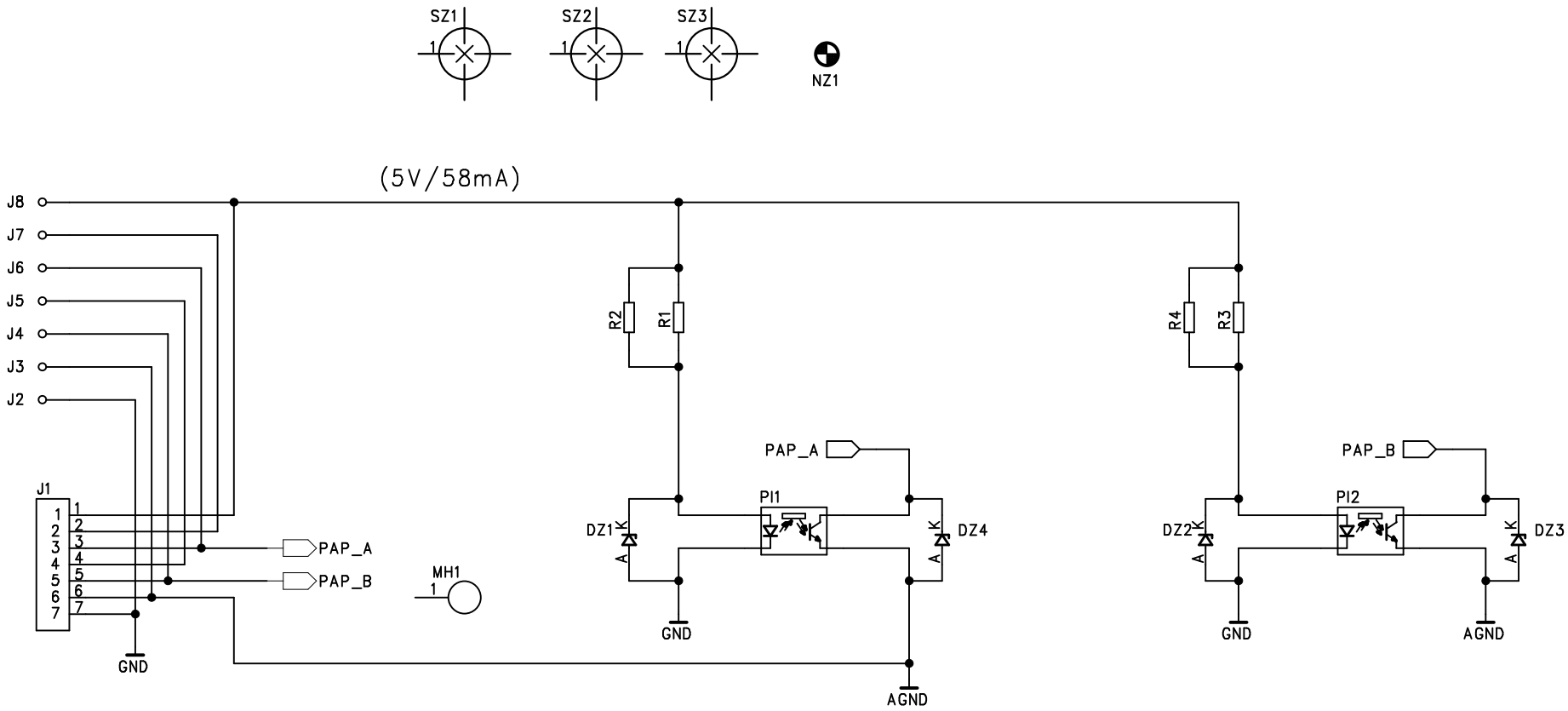
Schválil: Approved by:	JD 10/11/2003	Velikost: SIZE:	A2
Nazev vyrobku: Product name:	POWER	List: Sheet:	1 z of 1
		Cislo vykresu: Sheet number:	073-53power102z3



Zmena: **Change No.:**	Popis zmeny: **Change description:**	Navrhoval: **Designed by:**	Schvalil: **Approved by:**	Predesla verze: **Previous version:**
V2	Added DZ1–DZ4 – for electrostatic immunity	TN 24/02/2004	TN 24/02/2004	101

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Schvalil: Approved by:	JD 20.2.2003
Nazev vyrobku: Product name:	PAPER MONITOR

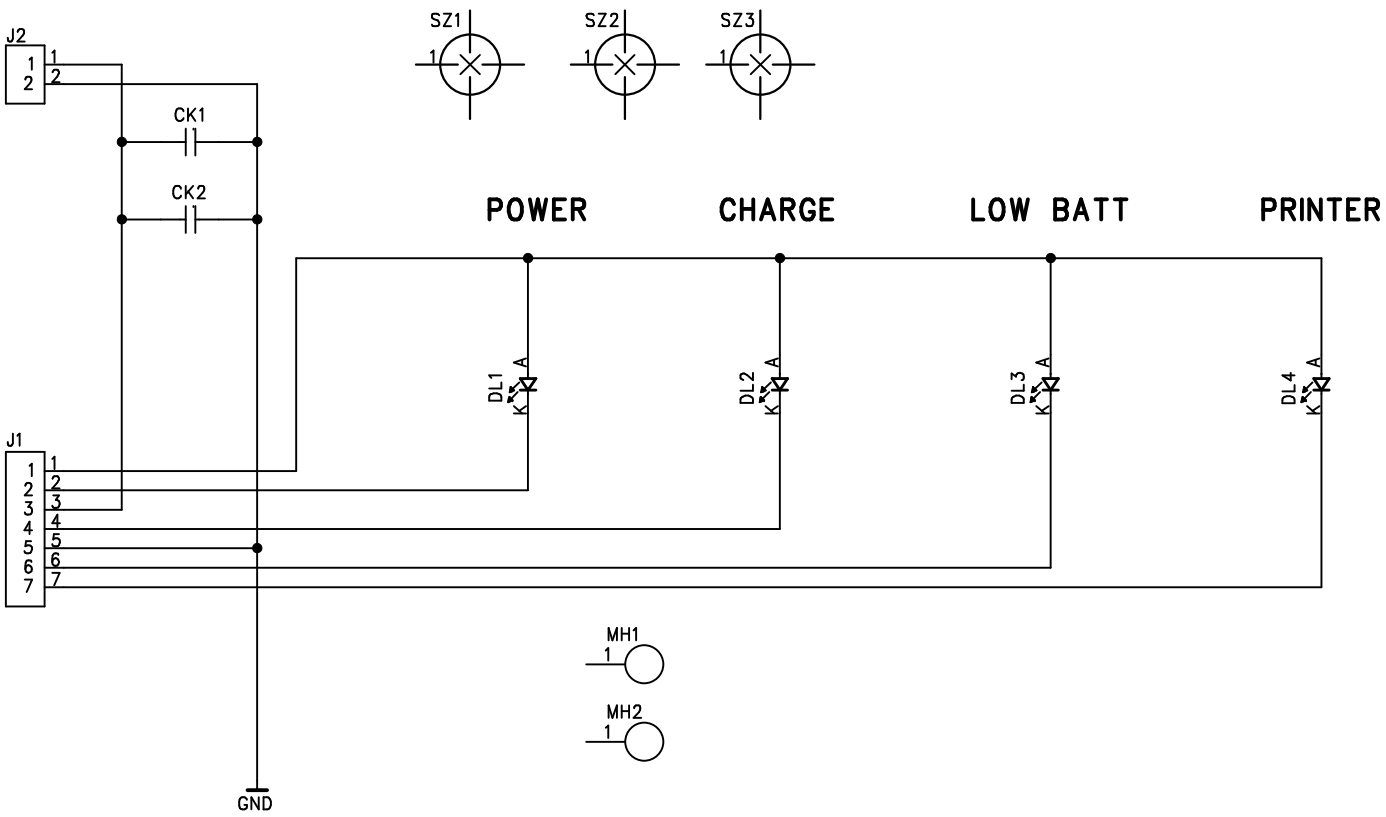
MEDICAL TECHNOLOGIES

Medical Technologies Ltd.

Velikost: SIZE: A4

List: Sheet: 1 z of 1

Cislo vykresu: Sheet number: 073-53PAPER102



Zmena: **Change No.:**	Popis zmeny: **Change description:**	Navrhoval: **Designed by:**	Schvalil: **Approved by:**	Predesla verze: **Previous version:**
101	J2,CK1,CK2 added	TN28.10.2003	JD29.10.2003	100

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Navrhoval: Designed by:	TN 21.1.2003
Schvalil: Approved by:	JD 20.2.2003
Nazev vyrobku: Product name:	LED INDICATOR

MEDICAL TECHNOLOGIES

Medical Technologies Ltd.

Velikost: SIZE:	A4
List: Sheet:	1 z of 1
Cislo vykresu: Sheet number:	073-53LEDS101

PART TYPE	Reference	Side
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ECE+47U35VXXM	CE2	Top
ECE+47U35VXXM	CE3	Top
ECE+47U35VXXM	CE4	Top
ECE+47U35VXXM	CE5	Top
ECE+47U35VXXM	CE6	Top
ECE+47U35VXXM	CE8	Top
ECE+47U35VXXM	CE9	Top
ECE+47U35VXXM	CE10	Top
ECE+47U35VXXM	CE11	Top
ECE+47U35VXXM	CE12	Top
ECE+47U35VXXM	CE13	Top
ECE+47U35VXXM	CE14	Top
ECE+47U35VXXM	CE15	Top
ECE+47U35VXXM	CE19	Top
ECE+47U35VXXM	CE20	Top
ECE+47U35VXXM	CE23	Top
ECE+47U35VXXM	CE32	Top
ECE+47U35VXXM	CE36	Top
ECE+47U35VXXM	CE39	Top
ECE+47U35VXXM	CE40	Top
ECE+47U35VXXM	CE42	Top
ECE+47U35VXXM	CE43	Top
ECE+2.2U50VXXM	CE44	Top
ECE+47U35VXXM	CE45	Top
ECE+47U35VXXM	CE46	Bottom
ECE+47U35VXXM	CE47	Top
ECE+47U35VXXM	CE48	Top
ECE+47U35VXXM	CE49	Top
ECE+47U35VXXM	CE50	Top
ECE-330U35VXXM	CE51	Top
ECE+47U35VXXM	CE52	Top
ECE+47U35VXXM	CE53	Top
ECE-330U35VXXM	CE54	Top
ECE+47U35VXXM	CE56	Top
ECE-330U35VXXM	CE61	Top
ECE+47U35VXXM	CE62	Top
ECE+47U35VXXM	CE63	Top
ECE+47U35VXXM	CE64	Top
ECE+47U35VXXM	CE65	Bottom
ECE+47U35VXXM	CE66	Top
ECE+47U35VXXM	CE67	Top
ECE+47U35VXXM	CE68	Top
ECE-330U35VXXM	CE70	Top
ECE-330U35VXXM	CE71	Top
ECE-330U35VXXM	CE72	Top
ECE-330U35VXXM	CE73	Top
ECE-330U35VXXM	CE74	Top
ECE+47U35VXXM	CE78	Top
ECF-100N250VXXB	CF1	Top
ECK+22P50VXXJ	CK1	Bottom
ECK+22P50VXXJ	CK2	Bottom
ECK+22P50VXXJ	CK3	Bottom
ECK+22P50VXXJ	CK4	Bottom

ECK+100N50VXXZ	CK5	Top
ECK+470P50VXXJ	CK6	Bottom
ECK+470P50VXXJ	CK7	Bottom
ECK+100N50VXXZ	CK8	Top
ECK+100N50VXXZ	CK9	Top
ECK+100N50VXXZ	CK10	Top
ECK+100N50VXXZ	CK11	Top
ECK+100N50VXXZ	CK12	Top
ECK+100N50VXXZ	CK13	Top
ECK+100N50VXXZ	CK14	Top
ECK+100N50VXXZ	CK15	Top
ECK+100N50VXXZ	CK16	Bottom
ECK+100N50VXXZ	CK17	Bottom
ECK+100N50VXXZ	CK18	Bottom
ECK+100N50VXXZ	CK19	Bottom
ECK+1N50VXXJ	CK20	Bottom
ECK+1N50VXXJ	CK21	Top
ECK+1N50VXXJ	CK22	Bottom
ECK+470P50VXXJ	CK47	Top
ECK+470P50VXXJ	CK48	Bottom
ECK+470P50VXXJ	CK49	Bottom
ECK+470P50VXXJ	CK50	Bottom
ECK+100N50VXXZ	CK51	Top
ECK+100N50VXXZ	CK52	Top
ECK+100N50VXXZ	CK53	Bottom
ECK+100N50VXXZ	CK54	Bottom
ECK+100N50VXXZ	CK55	Bottom
ECK+100N50VXXZ	CK56	Bottom
ECK+100N50VXXZ	CK57	Bottom
ECK+100N50VXXZ	CK58	Bottom
ECK+100N50VXXZ	CK59	Top
ECK+100N50VXXZ	CK60	Top
ECK+100N50VXXZ	CK61	Top
ECK+100N50VXXZ	CK62	Top
ECK+100N50VXXZ	CK63	Top
ECK+100N50VXXZ	CK64	Bottom
ECK+100N50VXXZ	CK65	Bottom
ECK+100N50VXXZ	CK66	Top
ECK+22P50VXXJ	CK67	Top
ECK+22P50VXXJ	CK68	Top
ECK+100N50VXXZ	CK69	Bottom
ECK+100N50VXXZ	CK70	Bottom
ECK+1N50VXXJ	CK71	Top
ECK+100N50VXXZ	CK72	Top
ECK+100N50VXXZ	CK73	Bottom
ECK+3U316VXXZ	CK74	Bottom
ECK+100N50VXXZ	CK75	Bottom
ECK+100N50VXXZ	CK76	Bottom
ECK+100N50VXXZ	CK77	Top
ECK+470P50VXXJ	CK78	Bottom
ECK+470P50VXXJ	CK79	Bottom
ECK+100N50VXXZ	CK80	Bottom
ECK+1N50VXXJ	CK81	Top
ECK+100N50VXXZ	CK82	Bottom
ECK+100N50VXXZ	CK83	Bottom
ECK+100N50VXXZ	CK84	Bottom

ECK+100N50VXXZ	CK85	Top
ECK+3U316VXXZ	CK86	Bottom
ECK+100N50VXXZ	CK87	Top
ECK+100N50VXXZ	CK88	Bottom
ECK+100N50VXXZ	CK89	Bottom
ECK+100N50VXXZ	CK90	Bottom
ECK+100N50VXXZ	CK109	Top
ECK+1N50VXXJ	CK110	Top
ECK+1N50VXXJ	CK111	Bottom
ECK+1N50VXXJ	CK112	Top
ECK+100N50VXXZ	CK113	Top
ECK+100N50VXXZ	CK114	Top
ECK+100N50VXXZ	CK115	Top
ECK+100N50VXXZ	CK116	Top
ECK+100N50VXXZ	CK117	Bottom
ECK+100N50VXXZ	CK118	Top
ECK+100N50VXXZ	CK119	Top
ECK+1N50VXXJ	CK120	Top
ECK+100N50VXXZ	CK121	Top
ECK+100N50VXXZ	CK122	Top
ECK+100N50VXXZ	CK123	Top
ECK+100N50VXXZ	CK124	Top
ECK-47P500VXX0	CK125	Top
ECK+1N50VXXJ	CK126	Bottom
ECK+1N50VXXJ	CK127	Bottom
ECK+1N50VXXJ	CK128	Top
ECK+100N50VXXZ	CK129	Bottom
ECK+100N50VXXZ	CK130	Bottom
ECK+100N50VXXZ	CK131	Bottom
ECK-47P500VXX0	CK132	Top
ECK+100N50VXXZ	CK133	Top
ECK-47P500VXX0	CK134	Top
ECK+100N50VXXZ	CK135	Bottom
ECK-47P500VXX0	CK136	Top
ECK+100N50VXXZ	CK137	Bottom
ECK+1N50VXXJ	CK138	Bottom
ECK+100N50VXXZ	CK139	Top
ECK+100N50VXXZ	CK140	Top
ECK+100N50VXXZ	CK141	Bottom
ECK+1N50VXXJ	CK142	Bottom
ECK+100N50VXXZ	CK143	Bottom
ECK+1N50VXXJ	CK144	Bottom
ECK+100N50VXXZ	CK145	Top
ECK+1N50VXXJ	CK146	Bottom
ECK+100N50VXXZ	CK147	Bottom
ECK+100N50VXXZ	CK148	Top
ECK+100N50VXXZ	CK149	Top
ECK+100N50VXXZ	CK150	Top
ECK+1N50VXXJ	CK151	Bottom
ECK+1N50VXXJ	CK152	Bottom
ECK+100N50VXXZ	CK153	Bottom
ECK+100N50VXXZ	CK154	Top
ECK+100N50VXXZ	CK155	Bottom
ECK+100N50VXXZ	CK156	Bottom
ECK+100N50VXXZ	CK157	Bottom
ECK+100N50VXXZ	CK158	Top

ECK+100N50VXXZ	CK159	Bottom
ECK+1N50VXXJ	CK160	Top
ECK+100N50VXXZ	CK161	Bottom
ECK+100N50VXXZ	CK162	Top
ECK+100N50VXXZ	CK163	Bottom
ECK+100N50VXXZ	CK164	Bottom
ECK+1N50VXXJ	CK165	Bottom
ECK+100N50VXXZ	CK166	Bottom
ECK+100N50VXXZ	CK167	Top
ECK+100N50VXXZ	CK168	Bottom
ECK+100P50VXXJ	CK169	Bottom
ECK+100P50VXXJ	CK170	Top
ECK+47P50VXXJ	CK171	Top
ECK+47P50VXXJ	CK172	Top
ECK+1N50VXXJ	CK173	Bottom
ECK+100N50VXXZ	CK174	Bottom
ECK+22P50VXXJ	CK175	Top
ECK+3U316VXXZ	CK176	Top
ECK+3U316VXXZ	CK177	Top
ECK+3U316VXXZ	CK178	Top
ECK+100N50VXXZ	CK179	Bottom
ECK+3U316VXXZ	CK180	Top
ECK+3U316VXXZ	CK181	Top
ECK+3U316VXXZ	CK182	Top
ECK+3U316VXXZ	CK183	Top
ECK+3U316VXXZ	CK184	Bottom
ECK+3U316VXXZ	CK185	Bottom
ECK+3U316VXXZ	CK186	Bottom
ECK+3U316VXXZ	CK187	Top
ECK+3U316VXXZ	CK188	Bottom
ECK+3U316VXXZ	CK189	Bottom
ECK+3U316VXXZ	CK190	Top
ECK+3U316VXXZ	CK191	Top
ECK+3U316VXXZ	CK192	Top
ECK+3U316VXXZ	CK193	Top
ECK+3U316VXXZ	CK194	Top
ECK+3U316VXXZ	CK195	Bottom
ECK+3U316VXXZ	CK196	Bottom
ECK+100N50VXXZ	CK197	Bottom
ECK+100N50VXXZ	CK198	Top
ECK+22P50VXXJ	CK199	Top
ECK+22P2KVXXJ	CK200	Bottom
ECK+22P2KVXXJ	CK201	Bottom
ECK+22P50VXXJ	CK202	Top
ECK+3U316VXXZ	CK205	Bottom
ECK+3U316VXXZ	CK206	Bottom
ECK+3U316VXXZ	CK207	Bottom
ECK+3U316VXXZ	CK208	Bottom
ECK+3U316VXXZ	CK209	Bottom
ECK+3U316VXXZ	CK210	Bottom
ECK+3U316VXXZ	CK211	Top
ED+US1G400VXX0	D1	Bottom
EDD+BAV99XX0	DD1	Bottom
EDD+BAV99XX0	DD2	Bottom
EDD+BAV99XX0	DD3	Bottom
EDD+BAV99XX0	DD4	Bottom

EDD+BAV99XX0	DD5	Bottom
EDD+BAV99XX0	DD6	Bottom
EDD+BAV99XX0	DD7	Bottom
EDD+BAV99XX0	DD8	Bottom
EDD+BAV99XX0	DD9	Bottom
EDD+BAV99XX0	DD10	Bottom
EDD+BAV99XX0	DD11	Bottom
EDD+BAV99XX0	DD12	Top
EDD+BAV99XX0	DD13	Bottom
EDD+BAV99XX0	DD14	Top
EDD+BAV99XX0	DD15	Bottom
EDD+BAV99XX0	DD16	Top
EDD+BAV99XX0	DD17	Bottom
EDD+BAV99XX0	DD18	Bottom
EDD+BAV99XX0	DD19	Top
EDD+BAV99XX0	DD20	Bottom
EDD+BAV99XX0	DD21	Top
EDD+BAV99XX0	DD22	Bottom
EDD+BAV99XX0	DD23	Top
EDD+BAV99XX0	DD24	Bottom
EDD+BAV99XX0	DD25	Top
EDD+BAV99XX0	DD26	Bottom
EDD+BAV99XX0	DD27	Top
EDD+BAV99XX0	DD28	Bottom
EDD+BAV99XX0	DD29	Bottom
EDD+BAV99XX0	DD30	Top
EDD+BAV99XX0	DD31	Bottom
EDD+BAV99XX0	DD32	Top
EDD+BAV99XX0	DD33	Bottom
EDD+BAV99XX0	DD34	Top
EDD+BAV99XX0	DD35	Top
EDD+BAV99XX0	DD36	Top
EDD+BAV99XX0	DD37	Bottom
EDD+BAV99XX0	DD38	Top
EDD+BAV99XX0	DD39	Top
EDD+BAV99XX0	DD40	Bottom
EDD+BAV99XX0	DD41	Bottom
EDD+BAV99XX0	DD42	Top
EDD+BAV99XX0	DD43	Bottom
EDD+BAV99XX0	DD44	Bottom
EDD+BAV99XX0	DD45	Top
EDD+BAV99XX0	DD46	Bottom
EDD+BAV99XX0	DD47	Bottom
EDD+BAV99XX0	DD48	Bottom
EDD+BAV99XX0	DD49	Bottom
EDD+BAV99XX0	DD50	Bottom
EDD+BAV99XX0	DD51	Bottom
EDD+BAV99XX0	DD52	Bottom
EDD+BAV99XX0	DD53	Bottom
EDD+BAV99XX0	DD54	Bottom
EDD+BAV99XX0	DD83	Bottom
EDL+SMDGREENXX0	DL1	Top
EDL+SMDGREENXX0	DL2	Top
EDS+SS16XX0	DS1	Top
EDS+SS16XX0	DS2	Top
EDS+SS16XX0	DS3	Top

EDS+SS16XX0	DS4	Top
EDS+SS16XX0	DS5	Bottom
EDS+SS16XX0	DS6	Bottom
EDS+SS16XX0	DS7	Bottom
EDZ+BZX842V7XX0	DZ1	Bottom
EDZ+BZX84C13XXJ	DZ2	Bottom
EDZ+BZX84C10XXJ	DZ3	Bottom
EDZ+BZX842V7XX0	DZ4	Bottom
EDZ+BZX842V7XX0	DZ5	Bottom
EDZ+BZX842V7XX0	DZ6	Bottom
EDZ+BZX842V7XX0	DZ7	Bottom
EDZ+BZX84C13XXJ	DZ8	Bottom
EDZ+BZX845V6XXJ	DZ9	Bottom
EDZ+BZX845V6XXJ	DZ10	Bottom
EDZ+BZX845V6XXJ	DZ12	Bottom
EJ-BL840GDXX0	J1	Top
EJ+JUMPERXX0	J2	Top
EJ+52435-28MX0	J3	Top
EJ-52044-20MX0	J4	Bottom
EJ-S2G14XX0	J5	Top
EJ+JUMPERXX0	J6	Top
EJ-S1G4XX0	J8	Top
EJ-S1G4XX0	J9	Top
EJ-S2G20XX0	J10	Top
EJ-S2G20XX0	J11	Top
EJ-52044-14MX0	J12	Bottom
EJ-S1G20XX0	J13	Bottom
EJ-89400-15XX0	J15	Top
EJ-89400-16XX0	J16	Top
EJ-PSH0204WXX0	J17	Top
EJ-S1G2XX0	J18	Top
EJ-89400-07XX0	J19	Top
EJ-89400-07XX0	J20	Top
EJ-S1G4WXX0	J21	Top
EJ+JUMPERXX0	J22	Top
EJ-B06-VHJS0	J23	Top
EJ-52044-20MX0	J24	Top
EJ-MLW26GXX0	J25	Top
EJ+52207-04MX0	J26	Bottom
EJ-S1G4SXX0	J27	Top
EJ+52207-04MX0	J28	Top
EJ+B03-BHXX0	J29	Top
EJ+B03-BHXX0	J30	Bottom
EJ+6504-34P2XX0	J700	Top
EL+JCB09152XX0	L1	Bottom
EL+JCB09151XX0	L2	Top
EL+JCB09151XX0	L3	Top
EL+JCB09151XX0	L4	Top
EL+JCB09151XX0	L5	Top
EL+JCB09151XX0	L6	Bottom
EL+JCB09151XX0	L7	Top
EL+JCB09151XX0	L8	Top
EL+JCB09151XX0	L9	Bottom
EL+JCB09151XX0	L10	Top
EL+JCB09151XX0	L11	Top
EL+JCB09151XX0	L12	Bottom

EL+JCB09151XX0	L13	Top
EL+JCB09151XX0	L14	Bottom
EL+JCB09152XX0	L15	Top
EL+JCB09151XX0	L16	Top
EL+JCB09151XX0	L17	Top
EL+JCB09151XX0	L18	Top
EL+JCB09152XX0	L46	Top
EL+JCB09151XX0	L47	Bottom
EL+JCB09152XX0	L48	Bottom
EL+JCB09151XX0	L49	Bottom
EL+JCB09152XX0	L50	Top
EL+JCB09152XX0	L51	Bottom
EL+JCB09152XX0	L52	Bottom
EL+JCB09152XX0	L53	Top
EL+JCB09152XX0	L54	Bottom
EL+JCB09151XX0	L55	Bottom
EL+JCB09151XX0	L56	Bottom
EL+JCB09151XX0	L57	Bottom
EL+JCB09151XX0	L58	Bottom
EL+JCB09152XX0	L59	Bottom
EL+JCB09152XX0	L60	Bottom
EL+JCB09152XX0	L61	Bottom
EL+JCB09152XX0	L62	Top
EL+JCB09152XX0	L63	Top
EL+JCB09152XX0	L64	Top
EL+JCB09152XX0	L65	Top
EL+JCB09152XX0	L66	Top
EL+JCB09152XX0	L67	Bottom
EL+JCB09152XX0	L68	Bottom
EL+JCB09152XX0	L69	Bottom
EL+JCB09151XX0	L70	Bottom
EL+JCB09151XX0	L71	Bottom
EL+JCB09152XX0	L72	Bottom
EL+JCB09152XX0	L73	Bottom
EL+JCB09151XX0	L74	Top
EL+JCB09151XX0	L75	Bottom
EL+JCB09152XX0	L76	Bottom
EL+JCB09151XX0	L77	Bottom
EL+JCB09152XX0	L78	Bottom
EL+JCB09152XX0	L79	Bottom
EL+JCB09152XX0	L84	Top
EL+JCB09152XX0	L86	Top
EL+JCB09151XX0	L87	Top
EL+JCB09151XX0	L88	Bottom
EL+JCB09152XX0	L89	Top
EL+JCB09152XX0	L91	Top
EL+JCB09152XX0	L92	Top
EL+JCB09152XX0	L93	Top
EL+JCB09152XX0	L94	Top
EL+220U0.66AXX0	L95	Top
EL+68U1.52AXX0	L96	Top
EL+68U1.52AXX0	L97	Top
EL+JCB09152XX0	L99	Bottom
EL+68U1.52AXX0	L100	Top
EL+JCB09152XX0	L101	Bottom
EL+JCB09152XX0	L102	Bottom

EL+JCB09152XX0	L104	Bottom
MTHOLE3.2	MH1	Top
MTHOLE3.2	MH2	Top
MTHOLE3.2	MH3	Top
MTHOLE3.2	MH4	Top
MTHOLE3.2	MH5	Top
NAVADECI_ZNACKA_BUTTERFLY	NZ1	Top
NAVADECI_ZNACKA_BUTTERFLY	NZ2	Top
NAVADECI_ZNACKA_BUTTERFLY	NZ3	Top
NAVADECI_ZNACKA_BUTTERFLY	NZ4	Top
NAVADECI_ZNACKA_BUTTERFLY	NZ5	Bottom
NAVADECI_ZNACKA_BUTTERFLY	NZ6	Bottom
NAVADECI_ZNACKA_BUTTERFLY	NZ7	Bottom
NAVADECI_ZNACKA_BUTTERFLY	NZ8	Bottom
EO+H11L1VXX0	O2	Top
EO+H11L1VXX0	O3	Top
ER+10R0.1WXXF	R1	Bottom
ER+47R0.1WXXF	R2	Bottom
ER+47K0.1WXXF	R3	Bottom
ER+47K0.1WXXF	R4	Bottom
ER+47K0.1WXXF	R5	Bottom
ER+470R0.1WXXF	R6	Bottom
ER+1K0.1WXXF	R7	Top
ER+4K70.1WXXF	R8	Bottom
ER+47R0.1WXXF	R9	Top
ER+47R0.1WXXF	R10	Bottom
ER+47R0.1WXXF	R11	Top
ER+0RXX1	R12	Top
ER+10K0.1WXXF	R13	Top
ER+10K0.1WXXF	R14	Bottom
ER+10K0.1WXXF	R15	Top
ER+47K0.1WXXF	R16	Top
ER+47K0.1WXXF	R17	Top
ER+10K0.1WXXF	R18	Top
ER+1K0.1WXXF	R19	Top
ER+0RXX1	R20	Top
ER-1R0.6WXX0	R21	Top
ER+0RXX1	R22	Top
ER+0RXX1	R23	Top
ER+4K70.1WXXF	R24	Bottom
ER+4K70.1WXXF	R25	Bottom
ER+4K70.1WXXF	R26	Bottom
ER+4K70.1WXXF	R27	Bottom
ER+1M0.1WXXF	R28	Bottom
ER+100K0.1WXXF	R29	Bottom
ER+1M0.1WXXF	R30	Bottom
ER+1M0.1WXXF	R31	Bottom
ER+1M0.1WXXF	R32	Bottom
ER+1M0.1WXXF	R33	Bottom
ER+1M0.1WXXF	R34	Bottom
ER+1M0.1WXXF	R35	Bottom
ER+10R0.1WXXF	R36	Bottom
ER+10R0.1WXXF	R37	Bottom
ER+10R0.1WXXF	R38	Bottom
ER+10R0.1WXXF	R39	Bottom
ER+10R0.1WXXF	R40	Bottom

ER+10R0.1WXXF	R41	Bottom
ER+10R0.1WXXF	R42	Bottom
ER+10R0.1WXXF	R43	Bottom
ER+10R0.1WXXF	R44	Top
ER+10R0.1WXXF	R45	Top
ER+10R0.1WXXF	R46	Top
ER+10R0.1WXXF	R47	Top
ER+470R0.1WXXF	R48	Bottom
ER+470R0.1WXXF	R49	Bottom
ER+470R0.1WXXF	R50	Bottom
ER+470R0.1WXXF	R51	Bottom
ER+470R0.1WXXF	R52	Bottom
ER+4K70.1WXXF	R53	Bottom
ER+220R0.1WXXF	R54	Bottom
ER+470R0.1WXXF	R55	Bottom
ER+470R0.1WXXF	R56	Top
ER+470R0.1WXXF	R57	Bottom
ER+470R0.1WXXF	R58	Top
ER+470R0.1WXXF	R59	Bottom
ER+470R0.1WXXF	R60	Top
ER+470R0.1WXXF	R61	Bottom
ER+470R0.1WXXF	R62	Top
ER+470R0.1WXXF	R63	Bottom
ER+470R0.1WXXF	R64	Top
ER+470R0.1WXXF	R65	Bottom
ER+470R0.1WXXF	R66	Top
ER+470R0.1WXXF	R67	Bottom
ER+470R0.1WXXF	R68	Top
ER+4K70.1WXXF	R69	Top
ER+470R0.1WXXF	R70	Bottom
ER+470R0.1WXXF	R71	Top
ER+470R0.1WXXF	R72	Bottom
ER+470R0.1WXXF	R73	Top
ER+470R0.1WXXF	R74	Bottom
ER+470R0.1WXXF	R75	Top
ER+470R0.1WXXF	R76	Bottom
ER+470R0.1WXXF	R77	Top
ER+470R0.1WXXF	R78	Bottom
ER+470R0.1WXXF	R79	Bottom
ER+47K0.1WXXF	R80	Top
ER+470R0.1WXXF	R81	Bottom
ER+470R0.1WXXF	R82	Top
ER+470R0.1WXXF	R83	Bottom
ER+470R0.1WXXF	R84	Bottom
ER+470R0.1WXXF	R85	Top
ER+470R0.1WXXF	R86	Bottom
ER+470R0.1WXXF	R87	Top
ER+470R0.1WXXF	R88	Bottom
ER+470R0.1WXXF	R89	Top
ER+470R0.1WXXF	R90	Bottom
ER+470R0.1WXXF	R91	Top
ER+470R0.1WXXF	R92	Bottom
ER+470R0.1WXXF	R93	Top
ER+470R0.1WXXF	R94	Bottom
ER+470R0.1WXXF	R95	Top
ER+470R0.1WXXF	R96	Top

ER+470R0.1WXXF	R97	Top
ER+470R0.1WXXF	R98	Top
ER+470R0.1WXXF	R99	Top
ER+470R0.1WXXF	R100	Top
ER+470R0.1WXXF	R101	Top
ER+470R0.1WXXF	R102	Top
ER+470R0.1WXXF	R103	Bottom
ER+470R0.1WXXF	R104	Top
ER+470R0.1WXXF	R105	Top
ER+470R0.1WXXF	R106	Bottom
ER+4K70.1WXXF	R107	Top
ER+470R0.1WXXF	R108	Top
ER+470R0.1WXXF	R109	Top
ER+470R0.1WXXF	R110	Top
ER+4K70.1WXXF	R111	Top
ER+470R0.1WXXF	R112	Top
ER+1K0.1WXXF	R113	Top
ER+2K20.1WXXF	R114	Bottom
ER+4K70.1WXXF	R115	Top
ER+47R0.1WXXF	R116	Bottom
ER+47K0.1WXXF	R117	Top
ER+4K70.1WXXF	R118	Top
ER+4K70.1WXXF	R119	Top
ER+4K70.1WXXF	R120	Top
ER+47K0.1WXXF	R121	Top
ER+470R0.1WXXF	R122	Top
ER+47K0.1WXXF	R123	Top
ER+47K0.1WXXF	R124	Top
ER+47K0.1WXXF	R125	Top
ER+47K0.1WXXF	R126	Top
ER+47K0.1WXXF	R127	Top
ER+47K0.1WXXF	R128	Top
ER+47R0.1WXXF	R129	Top
ER+47R0.1WXXF	R130	Top
ER+47R0.1WXXF	R131	Top
ER+47R0.1WXXF	R132	Top
ER+47R0.1WXXF	R133	Top
ER+47R0.1WXXF	R134	Top
ER+47R0.1WXXF	R135	Top
ER+47R0.1WXXF	R136	Top
ER+47R0.1WXXF	R137	Top
ER+47R0.1WXXF	R138	Top
ER+47R0.1WXXF	R139	Top
ER+47R0.1WXXF	R140	Top
ER+47R0.1WXXF	R141	Top
ER+47R0.1WXXF	R142	Top
ER+47R0.1WXXF	R143	Bottom
ER+470R0.1WXXF	R144	Bottom
ER+4R70.1WXX1	R145	Top
ER+10R0.1WXXF	R146	Top
ER+10K0.1WXXF	R147	Bottom
ER+470R0.1WXXF	R148	Top
ER+470R0.1WXXF	R149	Top
ER+0RXX1	R150	Top
ER+0RXX1	R151	Top
ER+4K70.1WXXF	R152	Top

ER+470R0.1WXXF	R153	Bottom
ER+100R0.1WXXF	R172	Bottom
ER+100R0.1WXXF	R173	Bottom
ER+10K0.1WXXF	R174	Bottom
ER+470R0.1WXXF	R175	Bottom
ER+470R0.1WXXF	R176	Bottom
ER+4K70.1WXXF	R177	Bottom
ER-1R0.6WXX0	R178	Top
ER-1R0.6WXX0	R179	Bottom
ER+47K0.1WXXF	R180	Bottom
ER+47K0.1WXXF	R181	Bottom
ER+4K70.1WXXF	R182	Bottom
ER+100R0.1WXXF	R183	Bottom
ER+100R0.1WXXF	R184	Bottom
ER+100R0.1WXXF	R185	Bottom
ER+100R0.1WXXF	R186	Bottom
ER+100R0.1WXXF	R187	Bottom
ER+100R0.1WXXF	R188	Bottom
ER+100R0.1WXXF	R189	Bottom
ER+100R0.1WXXF	R190	Bottom
ER+4K70.1WXXF	R191	Bottom
ER+1K0.1WXXF	R192	Bottom
ER+4K70.1WXXF	R193	Bottom
ER+47K0.1WXXF	R194	Bottom
ER+47K0.1WXXF	R195	Bottom
ER+4K70.1WXXF	R196	Bottom
ER+2K20.1WXXF	R197	Bottom
ER+10M0.1WXXJ	R198	Top
ER+10M0.1WXXJ	R199	Top
ER+4K70.1WXXF	R200	Bottom
ER+47K0.1WXXF	R201	Bottom
ER+47K0.1WXXF	R202	Bottom
ER+10K0.1WXXF	R203	Bottom
ER+10K0.1WXXF	R204	Bottom
ER+10K0.1WXXF	R205	Bottom
ER+10K0.1WXXF	R206	Bottom
ER+10K0.1WXXF	R207	Bottom
ER+4K70.1WXXF	R208	Bottom
ER-1R0.6WXX0	R209	Bottom
ER+10K0.1WXXF	R210	Top
ER+10K0.1WXXF	R211	Top
ER+10K0.1WXXF	R212	Top
ER+470R0.1WXXF	R213	Top
ER+470R0.1WXXF	R214	Top
ER+22K0.1WXXF	R215	Top
ER+47R0.1WXXF	R216	Bottom
ER+47R0.1WXXF	R217	Bottom
ER+47K0.1WXXF	R218	Top
ER+47K0.1WXXF	R219	Top
ER+47R0.1WXXF	R220	Bottom
ER+47R0.1WXXF	R221	Bottom
ER+47R0.1WXXF	R222	Bottom
ER+47R0.1WXXF	R223	Bottom
ER+47R0.1WXXF	R224	Bottom
ER+10K0.1WXXF	R225	Bottom
ER+0RXX1	R226	Bottom

ER+10K0.1WXXF	R227	Top
ER+10R0.1WXXF	R228	Bottom
ER+10R0.1WXXF	R229	Bottom
ER+1K0.1WXXF	R230	Bottom
ER+10M0.1WXXJ	R231	Top
ER+10K0.1WXXF	R232	Bottom
ER+1K0.1WXXF	R233	Bottom
ER+47R0.1WXXF	R234	Bottom
ER+47R0.1WXXF	R235	Top
ER+10R0.1WXXF	R236	Bottom
ER+10R0.1WXXF	R237	Bottom
ER+470R0.1WXXF	R238	Bottom
ER+4K70.1WXXF	R239	Bottom
ER+47R0.1WXXF	R240	Bottom
ER+47R0.1WXXF	R241	Bottom
ER+4K70.1WXXF	R242	Bottom
ER+4K70.1WXXF	R243	Bottom
ER+100R0.1WXXF	R244	Bottom
ER+47R0.1WXXF	R245	Bottom
ER+47R0.1WXXF	R246	Bottom
ER+47R0.1WXXF	R247	Bottom
ER+47R0.1WXXF	R248	Bottom
ER+47R0.1WXXF	R249	Bottom
ER+0RXX1	R250	Bottom
ER+0RXX1	R251	Bottom
ER+2R20.1WXXJ	R252	Bottom
ER+1K0.1WXXF	R253	Bottom
ER+22K0.1WXXF	R254	Bottom
ER+10K0.1WXXF	R255	Bottom
ER+4K70.1WXXF	R256	Top
ER+100R0.1WXXF	R257	Top
ER+4K70.1WXXF	R258	Top
ER+100R0.1WXXF	R259	Top
ER+4K70.1WXXF	R260	Top
ER+100R0.1WXXF	R261	Top
ER+4K70.1WXXF	R262	Top
ER+100R0.1WXXF	R263	Top
ER+47R0.1WXXF	R264	Top
ER+4K70.1WXXF	R265	Top
ER+4K70.1WXXF	R266	Top
ER+1K0.1WXXF	R267	Top
ER+47K0.1WXXF	R268	Bottom
ER+470R0.1WXXF	R269	Top
ER+47K0.1WXXF	R270	Top
ER+4K70.1WXXF	R271	Bottom
ER+4K70.1WXXF	R272	Top
ER+47K0.1WXXF	R273	Top
ER+10K0.1WXXF	R274	Bottom
ER+47K0.1WXXF	R275	Top
ER+47K0.1WXXF	R276	Bottom
ER+22K0.1WXXF	R277	Bottom
ER+47K0.1WXXF	R278	Bottom
ER+47K0.1WXXF	R279	Bottom
ER+10K0.1WXXF	R280	Bottom
ER+47K0.1WXXF	R281	Bottom
ER+4K70.1WXXF	R282	Bottom

ER+4K70.1WXXF	R283	Bottom
ER+4K70.1WXXF	R284	Bottom
ER+4K70.1WXXF	R285	Bottom
ER+4K70.1WXXF	R286	Top
ER+4K70.1WXXF	R287	Bottom
ER+47K0.1WXXF	R288	Top
ER+47K0.1WXXF	R289	Bottom
ER+22R0.1WXXF	R290	Top
ER+100R0.1WXXF	R291	Bottom
ER+47K0.1WXXF	R292	Top
ER+470R0.1WXXF	R293	Bottom
ER+470R0.1WXXF	R294	Bottom
ER+470R0.1WXXF	R295	Bottom
ER+470R0.1WXXF	R296	Top
ER+4K70.1WXXF	R297	Bottom
ER+22K0.1WXXF	R298	Bottom
ER+22K0.1WXXF	R299	Bottom
ER+0RXX1	R300	Bottom
ER+2R20.1WXXJ	R301	Bottom
ER+100K0.1WXXF	R321	Bottom
ER+100K0.1WXXF	R322	Top
ER+10K0.1WXXF	R323	Bottom
ER+10K0.1WXXF	R324	Top
ER+2K20.1WXXF	R325	Bottom
ER+22K0.1WXXF	R326	Top
ER+4K70.1WXXF	R327	Bottom
ER+470R0.1WXXF	R328	Bottom
ER+2K20.1WXXF	R329	Bottom
ER+22K0.1WXXF	R330	Top
ER+4K70.1WXXF	R331	Top
ER+4K70.1WXXF	R332	Top
ER+2K20.1WXXF	R333	Top
ER+2R20.1WXXJ	R334	Top
ER+2R20.1WXXJ	R335	Top
ER+22K0.1WXXF	R336	Top
ER+22K0.1WXXF	R337	Top
ER+47K0.1WXXF	R338	Top
ER+4K70.1WXXF	R339	Top
ER+47K0.1WXXF	R340	Top
ER+470R0.1WXXF	R341	Bottom
ER+100R0.1WXXF	R342	Bottom
ER+1K0.1WXXF	R343	Bottom
ER+10K0.1WXXF	R344	Bottom
ER+470R0.1WXXF	R345	Bottom
ER+100R0.1WXXF	R346	Bottom
ER+47K0.1WXXF	R347	Bottom
ER+2K20.1WXXF	R348	Bottom
ER+470R0.1WXXF	R349	Bottom
ER+2K20.1WXXF	R350	Bottom
ER+1K0.1WXXF	R351	Bottom
ER+10M0.1WXXJ	R352	Bottom
ER+10M0.1WXXJ	R353	Bottom
ER+2K20.1WXXF	R354	Bottom
ER+4K70.1WXXF	R355	Bottom
ER+2K20.1WXXF	R356	Bottom
ER+4K70.1WXXF	R357	Bottom

ER+0RXX1	R358	Bottom
ER+0RXX1	R359	Bottom
ER+0RXX1	R360	Top
ER+0RXX1	R361	Bottom
ER+0RXX1	R362	Top
ER+0RXX1	R363	Top
ER+1K0.1WXXF	R364	Bottom
ER+4K70.1WXXF	R365	Bottom
ER+1K0.1WXXF	R366	Bottom
ER+22K0.1WXXF	R367	Bottom
ER+470R0.1WXXF	R368	Top
ER+0RXX1	R369	Top
ER+0RXX1	R370	Top
ER+0RXX1	R371	Top
ER+0RXX1	R372	Top
ER+4K70.1WXXF	R373	Bottom
ER+0RXX1	R374	Bottom
ER+470R0.1WXXF	R375	Bottom
ER+1K0.1WXXF	R376	Bottom
ER+470R0.1WXXF	R377	Top
ER+1K0.1WXXF	R378	Top
ER+470R0.1WXXF	R379	Bottom
ER+470R0.1WXXF	R380	Bottom
ER+470R0.1WXXF	R381	Bottom
ER+4K70.1WXXF	R382	Bottom
ER+47R0.1WXXF	R383	Bottom
ER+47K0.1WXXF	R384	Bottom
ER+100R0.1WXXF	R385	Bottom
ER+22R0.1WXXF	R386	Bottom
ER+10K0.1WXXF	R387	Top
ER+10K0.1WXXF	R388	Bottom
ER+10K0.1WXXF	R389	Bottom
ER+10K0.1WXXF	R390	Top
ER+10K0.1WXXF	R391	Top
ER+10K0.1WXXF	R392	Top
ER+10K0.1WXXF	R393	Bottom
ER+10K0.1WXXF	R394	Bottom
ER+1K0.1WXXF	R395	Top
ER+0RXX1	R396	Top
ER+0RXX1	R397	Top
ER+10K0.1WXXF	R398	Top
ER+4K70.1WXXF	R399	Top
ER+4K70.1WXXF	R400	Top
ER+0RXX1	R401	Top
ER+47K0.1WXXF	R402	Bottom
ER+0RXX1	R403	Top
ER+2K20.1WXXF	R404	Bottom
ER+2K20.1WXXF	R405	Bottom
ER+10R0.1WXXF	R406	Bottom
ER+10R0.1WXXF	R407	Bottom
ER+10R0.1WXXF	R408	Top
ER+100R0.1WXXF	R409	Bottom
ER+10K0.1WXXF	R410	Bottom
ER+2K20.1WXXF	R411	Bottom
ER+4K70.1WXXF	R412	Bottom
ER+4K70.1WXXF	R413	Bottom

ER+4K70.1WXXF	R414	Bottom
ER+4R70.1WXX1	R415	Bottom
ER+47K0.1WXXF	R416	Top
ER+1K0.1WXXF	R417	Top
ER+22R0.1WXXF	R418	Top
ER+2K20.1WXXF	R419	Bottom
ER+10R0.1WXXF	R420	Bottom
ER+4K70.1WXXF	R421	Top
ER+4K70.1WXXF	R422	Top
ER+0RXX1	R423	Top
ER+0RXX1	R424	Top
ER+470R0.1WXXF	R425	Bottom
ER+470R0.1WXXF	R426	Bottom
ER+47R0.1WXXF	R427	Top
ER+47R0.1WXXF	R428	Top
ER+47R0.1WXXF	R429	Bottom
ER+47R0.1WXXF	R430	Top
ER+22K0.1WXXF	R431	Bottom
ER+0RXX1	R432	Bottom
ER+0RXX1	R433	Bottom
ER+0RXX1	R434	Bottom
ER+0RXX1	R435	Top
ER+0RXX1	R436	Top
ER+0RXX1	R437	Top
ER+4K70.1WXXF	R438	Bottom
ER+4R70.1WXX1	R439	Bottom
ER+47K0.1WXXF	R440	Bottom
ER+47K0.1WXXF	R441	Bottom
ER+22K0.1WXXF	R442	Bottom
ER+22K0.1WXXF	R443	Bottom
ER+4K70.1WXXF	R444	Bottom
ER+4K70.1WXXF	R445	Bottom
ER+4K70.1WXXF	R446	Bottom
ER+4K70.1WXXF	R447	Bottom
ER+0RXX1	R448	Bottom
ERT+KTY82220PH0	RT1	Top
ESP-KPE112XX0	SP1	Bottom
SESAZOVACI_ZNACKA	SZ1	Top
SESAZOVACI_ZNACKA	SZ2	Top
SESAZOVACI_ZNACKA	SZ3	Top
TEST_POINT	TP5	Top
TEST_POINT	TP6	Top
TEST_POINT	TP7	Top
TEST_POINT	TP8	Top
TEST_POINT	TP9	Top
TEST_POINT	TP10	Top
TEST_POINT	TP11	Top
TEST_POINT	TP12	Top
TEST_POINT	TP13	Top
TEST_POINT	TP14	Top
TEST_POINT	TP15	Top
TEST_POINT	TP16	Top
TEST_POINT	TP21	Top
TP_GND_4.0MM	TP22	Top
TP_GND_4.0MM	TP23	Top
TP_GND_4.0MM	TP24	Top

TEST_POINT	TP25	Top
TEST_POINT	TP26	Top
TEST_POINT	TP32	Top
TEST_POINT	TP33	Top
EUX+SG8002JFXX3	UX1	Top
EUX+SG8002JFXX4	UX2	Top
EUX+SG8002JFXX2	UX3	Top
UZEL_1_1	UZ1	Top
UZEL_1_1	UZ2	Top
UZEL_1_1	UZ4	Top
UZEL_1_1	UZ5	Top
UZEL_1_1	UZ7	Top
UZEL_1_1	UZ8	Top
UZEL_1_1	UZ9	Top
UZEL_1_1	UZ10	Top
UZEL_1_1	UZ11	Top
UZEL_DOWN1_3	UZ13	Top
EX+11.059MXX0	X1	Top
sr432	X2	Top
EX+22.118MXX0	X3	Top
ER-220R0,6WXXA	R500	
ECK-470P50VXXC	CK500	
ECK-470PX1Y2XXM	CK501	

PART TYPE	Reference	Side
ECE+2.2U50VXXM	CE1	Top
ECE+2.2U50VXXM	CE2	Top
ECE+2.2U50VXXM	CE3	Top
ECE+2.2U50VXXM	CE4	Top
ECE-47U450VXXM	CE18	Top
ECE-47U450VXXM	CE19	Top
ECE+47U35VXXM	CE20	Top
ECE+10U35VXXM	CE21	Top
ECE-330U35VXXM	CE23	Top
ECE-2200U35VXXM	CE24	Top
ECE-2200U35VXXM	CE25	Top
ECE-330U35VXXM	CE26	Top
ECE-47U450VXXM	CE27	Top
ECE-330U35VXXM	CE28	Top
ECE-330U35VXXM	CE29	Top
ECE-330U35VXXM	CE30	Top
ECE-330U35VXXM	CE31	Top
ECE+10U35VXXM	CE32	Top
ECE-330U35VXXM	CE33	Top
ECE+10U35VXXM	CE34	Top
ECE-330U35VXXM	CE35	Top
ECE-330U35VXXM	CE36	Top
ECE+10U35VXXM	CE37	Top
ECE-1000U35VXXM	CE38	Top
ECE-2200U35VXXM	CE40	Top
ECE-1000U35VXXM	CE41	Top
ECE-330U35VXXM	CE113	Top
ECE+2.2U50VXXM	CE118	Top
ECF-330N275VXXM	CF1	Top
ECK+100N50VXXZ	CK9	Top
ECK+10N50VXXZ	CK10	Top
ECK+100N50VXXZ	CK11	Top
ECK+100N50VXXZ	CK12	Top
ECK+10N50VXXZ	CK13	Top
ECK+100N50VXXZ	CK14	Top
ECK-2N2X1Y2XXM	CK15	Top
ECK+100N50VXXZ	CK17	Top
ECK+1N50VXXJ	CK18	Top
ECK-2N2X1Y2XXM	CK19	Top
ECK+100N50VXXZ	CK20	Top
ECK+100N50VXXZ	CK21	Top
ECK-1N0X1Y1XXM	CK22	Top
ECK+100P50VXXJ	CK23	Top
ECK+3U316VXXZ	CK24	Top
ECK+47P50VXXJ	CK25	Top
ECK+47P50VXXJ	CK26	Top
ECK+10N50VXXZ	CK27	Top
ECK-2N2X1Y2XXM	CK28	Top
ECK-2N2X1Y2XXM	CK29	Top
ECK-2N2X1Y2XXM	CK55	Top
ECK+100N50VXXZ	CK101	Top
ECK+100P50VXXJ	CK102	Top
ECK+1N50VXXJ	CK103	Top
ECK+470P50VXXJ	CK104	Top
ECK+100P50VXXJ	CK105	Top

ECK+100P50VXXJ	CK107	Top
ECK-470PX1Y2XXM	CK111	Top
ED+US1G400VXX0	D1	Top
ED+US1G400VXX0	D2	Top
ED+S3MXX0	D3	Top
ED-BYV29400XX0	D4	Top
ED+US1G400VXX0	D5	Top
ED+US1G400VXX0	D6	Top
ED-FR604XX0	D7	Top
ED-BYV29400XX0	D8	Top
ED+US1G400VXX0	D9	Top
ED+S1MXX0	D10	Top
ED+S1MXX0	D11	Top
ED+S1MXX0	D12	Top
ED+S1MXX0	D13	Top
EDD+BAV99XX0	DD1	Top
EDD+BAV99XX0	DD2	Top
EDD+BAV99XX0	DD3	Top
EDD+BAV99XX0	DD4	Top
EDD+BAV99XX0	DD5	Top
EDD+BAV99XX0	DD6	Top
EDD+BAV99XX0	DD7	Top
EDD+BAV99XX0	DD8	Top
EDD+BAV99XX0	DD9	Top
EDD+BAV99XX0	DD10	Top
EDD+BAV99XX0	DD102	Top
EDG-KBU08JXX0	DG800	Top
EDL+SMDGREENXX0	DL1	Top
EDL+SMDGREENXX0	DL2	Top
EDS+12CWQ06XX0	DS1	Top
EDS+12CWQ06XX0	DS2	Top
EDS+12CWQ06XX0	DS11	Top
EDS+12CWQ06XX0	DS16	Top
EDZ+BZX84C13XXJ	DZ1	Top
EDZ+BZX84C13XXJ	DZ2	Top
EDZ+BZX84C13XXJ	DZ3	Top
EDZ+BZX84C13XXJ	DZ4	Top
EDZ+BZX84C13XXJ	DZ5	Top
EDZ+BZX84C13XXJ	DZ6	Top
EF-MST5.0ASC0	F2	Top
EPOJ-FPG5SC0	F3	Top
EF-MST6.3ASC0	F200	Top
EJ-S1G2XX0	J1	Top
EJ-CAN9Z90XX0	J2	Top
EJ-89400-15XX0	J3	Top
EJ-B02-VHJS0	J4	Top
EJ-S1G2XX0	J5	Top
EJ-5281-NA4MX0	J6	Top
EJ-87531-04XX0	J8	Top
EJ-MLW26GXX0	J10	Top
EJ-B06-VHJS0	J23	Top
EJ-B02-VHJS0	J200	Top
EJ-GSP1SC1	J800	Top
EL+JCB09152XX0	L1	Top
EL+JCB09152XX0	L2	Top
EL+JCB09152XX0	L3	Top

EL+JCB09152XX0	L4	Top
EL+JCB09152XX0	L5	Top
EL+JCB09152XX0	L6	Top
EL+68U1.52AXX0	L7	Top
EL-K5BR6H2.5XX0	L8	Top
EL-K5BR6H2.5XX0	L9	Top
EL+JCB09152XX0	L10	Top
EL-3UXXM	L11	Top
EL+JCB09152XX0	L12	Top
EL+JCB09152XX0	L13	Top
EL-PM3.3M103XX0	L14	Top
EL+JCB09151XX0	L15	Top
EL+JCB09151XX0	L16	Top
EL+68U1.52AXX0	L17	Top
EL+10U4AXX0	L18	Top
EL+10U4AXX0	L19	Top
EL+10U4AXX0	L20	Top
EL+10U4AXX0	L21	Top
EL+68U1.52AXX0	L22	Top
EL+330U0.68AXX0	L23	Top
EL+JCB09151XX0	L24	Top
EL+JCB09151XX0	L25	Top
EL+10U4AXX0	L26	Top
EL-PMEC3.3MXX0	L27	Top
EL+68U1.52AXX0	L28	Top
EL-K5BR6H2.5XX0	L29	Top
EL+68U1.52AXX0	L30	Top
EL-PMEC3.3MXX0	L31	Top
EL+10U4AXX0	L32	Top
EL+JCB09151XX0	L33	Top
EL-K5BR6H2.5XX0	L34	Top
EL-K5BR6H2.5XX0	L35	Top
EL-K5BR6H2.5XX0	L36	Top
EL-PM3.3M103XX0	L802	Top
MTHOLE3.2_NONPLATED	MH1	Top
MTHOLE3.2_NONPLATED	MH2	Top
MTHOLE3.2	MH3	Top
MTHOLE3.2_NONPLATED	MH4	Top
MTHOLE3.2_NONPLATED	MH5	Top
MTHOLE3.2_NONPLATED	MH6	Top
MTHOLE3.2_NONPLATED	MH7	Top
MTHOLE3.2_NONPLATED	MH8	Top
MTHOLE3.2_NONPLATED	MH9	Top
MTHOLE3.2	MH10	Top
MTHOLE3.2	MH11	Top
MTHOLE3.2	MH12	Top
MTHOLE3.2GND	MH13	Top
MTHOLE6.0_NONPLATED	MH14	Top
MTHOLE3.2_NONPLATED	MH15	Top
MTHOLE6.0_NONPLATED	MH16	Top
MTHOLE6.0_NONPLATED	MH17	Top
MTHOLE6.0_NONPLATED	MH18	Top
MTHOLE6.0_NONPLATED	MH19	Top
MTHOLE6.0_NONPLATED	MH20	Top
MTHOLE6.0_NONPLATED	MH21	Top
MTHOLE3.2_NONPLATED	MH22	Top

MTHOLE3.2_NONPLATED	MH23	Top
MTHOLE3.2_NONPLATED	MH24	Top
MTHOLE3.2_NONPLATED	MH25	Top
MTHOLE6.0_NONPLATED	MH26	Top
MTHOLE3.2_NONPLATED	MH27	Top
MTHOLE3.2	MH28	Top
MTHOLE3.2_NONPLATED	MH29	Top
SROUB_3MM	MH30	Top
MTHOLE3.2	MH31	Top
MTHOLE3.2	MH32	Top
MTHOLE3.2_NONPLATED	MH33	Top
MTHOLE3.2	MH34	Top
MTHOLE3.2	MH35	Top
MTHOLE3.2	MH36	Top
MTHOLE3.2_NONPLATED	MH37	Top
MTHOLE3.2_NONPLATED	MH38	Top
MTHOLE3.2	MH39	Top
SROUB_3MM	MH40	Top
MTHOLE3.2	MH41	Top
MTHOLE3.2	MH42	Top
MTHOLE3.2_NONPLATED	MH43	Top
MTHOLE3.2_NONPLATED	MH44	Top
MTHOLE3.2	MH45	Top
MTHOLE3.2	MH46	Top
MTHOLE3.2	MH47	Top
MTHOLE3.2	MH48	Top
NAVADECI_ZNACKA_BUTTERFLY	NZ1	Top
NAVADECI_ZNACKA_BUTTERFLY	NZ2	Top
NAVADECI_ZNACKA_BUTTERFLY	NZ3	Top
NAVADECI_ZNACKA_BUTTERFLY	NZ4	Top
EO+PC817XX0	O3	Top
ER+47R0.1WXXF	R1	Top
ER+47R0.1WXXF	R2	Top
ER+47R0.1WXXF	R3	Top
ER+4K70.1WXXF	R16	Top
ER+470R0.1WXXF	R17	Top
ER+4K70.1WXXF	R18	Top
ER+4K70.1WXXF	R19	Top
ER+47R0.1WXXF	R20	Top
ER+47R0.1WXXF	R21	Top
ER+100R0.1WXXF	R22	Top
ER+100R0.1WXXF	R23	Top
ER+47R0.1WXXF	R24	Top
ER+100R0.1WXXF	R25	Top
ER+22K0.1WXXF	R26	Top
ER+4R70.1WXX1	R27	Top
ER+1K0.1WXXF	R28	Top
ER+22K0.1WXXF	R29	Top
ER+4K70.1WXXF	R30	Top
ER+10K0.1WXXF	R31	Top
ER+100R0.1WXXF	R32	Top
ER+100R0.1WXXF	R33	Top
ER+470R0.1WXXF	R34	Top
ER+4K70.1WXXF	R35	Top
ER+470R0.1WXXF	R36	Top
ER+470R0.1WXXF	R37	Top

ER+470R0.1WXXF	R38	Top
ER+470R0.1WXXF	R39	Top
ER+470R0.1WXXF	R40	Top
ER+47R0.1WXXF	R41	Top
ER+1K0.1WXXF	R42	Top
ER+470K0.1WXXF	R43	Top
ER+100K0.1WXXB	R44	Top
ER+22K1WXXJ	R45	Top
ER+22K1WXXJ	R46	Top
ER+470R0.1WXXF	R47	Top
ER+220K0.1WXXF	R48	Top
ER+100R0.1WXXF	R49	Top
ER+22K1WXXJ	R50	Top
ER+47R0.1WXXF	R51	Top
ER+100K0.1WXXB	R52	Top
ER+1K0.1WXXF	R53	Top
ER-220K0.6WXXJ	R54	Top
ER+22K1WXXJ	R55	Top
ER+1M0.1WXXF	R56	Top
ER+2K20.1WXXF	R57	Top
ER+4K70.1WXXF	R58	Top
ER+2K20.1WXXF	R59	Top
ER+22R0.1WXXF	R60	Top
ER+22R0.1WXXF	R61	Top
ER+47R0.1WXXF	R62	Top
ER+100K0.1WXXF	R63	Top
ER+2R20.1WXXJ	R64	Top
ER+4K70.1WXXF	R65	Top
ER+2K20.1WXXF	R66	Top
ER+2K20.1WXXF	R67	Top
ER+47K0.1WXXF	R68	Top
ER+47K0.1WXXF	R69	Top
ER+22K0.1WXXF	R70	Top
ER+22K0.1WXXF	R71	Top
ER+22R0.1WXXF	R72	Top
ER+1M0.1WXXF	R73	Top
ER+22K0.1WXXF	R74	Top
ER+220R0.1WXXF	R75	Top
ER+2K20.1WXXF	R76	Top
ER+100K0.1WXXF	R77	Top
ER+10R0.1WXXF	R78	Top
ER+470R0.1WXXF	R79	Top
ER-0.16R0.6WXX0	R80	Top
ER+470R0.1WXXF	R81	Top
ER-0.16R0.6WXX0	R82	Top
ER-0.16R0.6WXX0	R83	Top
ER+47R0.1WXXF	R84	Top
ER+100K0.1WXXF	R85	Top
ER+1K0.1WXXF	R86	Top
ER+10K0.1WXXF	R87	Top
ER+10R0.1WXXF	R88	Top
ER+100K0.1WXXB	R89	Top
ER+1K0.1WXXF	R90	Top
ER+2K20.1WXXF	R91	Top
ER+470K0.1WXXF	R92	Top
ER+47R0.1WXXF	R93	Top

ER+220K0.1WXXF	R94	Top
ER+10K0.1WXXB	R95	Top
ER+470K0.1WXXF	R96	Top
ER+4K70.1WXXF	R97	Top
ER+1K0.1WXXF	R98	Top
ER+10K0.1WXXF	R99	Top
ER+1K0.1WXXF	R110	Top
ER+470R0.1WXXF	R111	Top
ER+22K0.1WXXF	R112	Top
ER+22R0.1WXXF	R113	Top
ER+22R0.1WXXF	R114	Top
ER+470K0.1WXXF	R115	Top
ER+22R0.1WXXF	R116	Top
ER+10K0.1WXXF	R117	Top
ER-560R2WXXJ	R118	Top
ER+470R0.1WXXF	R119	Top
ER-0.16R0.6WXX0	R120	Top
ER-0.16R0.6WXX0	R121	Top
ER-0.16R0.6WXX0	R122	Top
ER-0.16R0.6WXX0	R123	Top
ER+22K0.1WXXF	R124	Top
ER+470R0.1WXXF	R125	Top
ER+4K70.1WXXF	R126	Top
ER+47K0.1WXXF	R127	Top
ER+10K0.1WXXF	R128	Top
ER+2K20.1WXXF	R129	Top
ER+4K70.1WXXF	R130	Top
ER+2K20.1WXXF	R131	Top
ER+10R0.1WXXF	R132	Top
ER+47R1WXXJ	R133	Top
ER+470K0.1WXXF	R134	Top
ER+47K0.1WXXF	R135	Top
ER+47R0.1WXXF	R136	Top
ER+22K0.1WXXF	R137	Top
ER+22K0.1WXXF	R138	Top
ER+22R0.1WXXF	R139	Top
ER+22K0.1WXXF	R140	Top
ER-0.16R0.6WXX0	R141	Top
ER+22K0.1WXXF	R142	Top
ER+1K0.1WXXF	R143	Top
ER+4K70.1WXXF	R144	Top
ER+1K0.1WXXF	R145	Top
ER+22K0.1WXXF	R146	Top
ER-0.16R0.6WXX0	R147	Top
ER+470R0.1WXXF	R148	Top
ER+22K0.1WXXF	R149	Top
ER+22R0.1WXXF	R150	Top
ER+10K0.1WXXF	R151	Top
ER+22K0.1WXXF	R152	Top
ER+10K0.1WXXF	R153	Top
ER+1K0.1WXXF	R154	Top
ER+2K20.1WXXF	R155	Top
ER+220K0.1WXXF	R156	Top
ER+470R0.1WXXF	R157	Top
ER+22K0.1WXXF	R158	Top
ER+22K0.1WXXF	R159	Top

ER+100K0.1WXXF	R160	Top
ER+47R0.1WXXF	R161	Top
ER+47R0.1WXXF	R162	Top
ER+2K20.1WXXF	R163	Top
ER+2R20.1WXXJ	R164	Top
ER+100K0.1WXXF	R165	Top
ER+22K0.1WXXF	R166	Top
ER+22R0.1WXXF	R167	Top
ER+470R0.1WXXF	R168	Top
ER+47K0.1WXXF	R169	Top
ER+150K0.1WXXF	R170	Top
ER+22R0.1WXXF	R171	Top
ER+220K0.1WXXF	R172	Top
ER+470R0.1WXXF	R173	Top
ER+4K70.1WXXF	R174	Top
ER+10K0.1WXXF	R175	Top
ER+47K0.1WXXF	R176	Top
ER+47K0.1WXXF	R177	Top
ER+1M0.1WXXF	R178	Top
ER+22R0.1WXXF	R179	Top
ER+10K0.1WXXF	R180	Top
ER+1M0.1WXXF	R181	Top
ER+100K0.1WXXF	R182	Top
ER-220K0.6WXXJ	R183	Top
ER+220R0.1WXXF	R184	Top
ER+470R0.1WXXF	R185	Top
ER+4K70.1WXXF	R195	Top
ER+4K70.1WXXF	R196	Top
ER+4K70.1WXXF	R197	Top
ER+4K70.1WXXF	R198	Top
ER+4K70.1WXXF	R199	Top
ER+4K70.1WXXF	R200	Top
ER+470K0.1WXXF	R201	Top
ER+220R0.1WXXF	R202	Top
ER+10R0.1WXXF	R203	Top
ER+47R0.1WXXF	R204	Top
ER+47R0.1WXXF	R205	Top
ER+2K20.1WXXF	R206	Top
ER+22K0.1WXXF	R207	Top
ER-1K0.6WXXA	R208	Top
ERT+KTY82220PH0	RT1	Bottom
ERT-B57364XX0	RV1	Top
ERV-ERZV14DXX0	RV800	Top
SESAZOVACI_ZNACKA	SZ1	Top
SESAZOVACI_ZNACKA	SZ2	Top
SESAZOVACI_ZNACKA	SZ3	Top
M073-5001100	TR2	Top
EU+ST232CDXX0	U1	Top
EU-IR2112XX0	U8	Top
EU+TL431XX0	U10	Top
EU+TL431XX0	U11	Top
EU+LM2596ADJXX0	U12	Top
EU+UC3845XX0	U100	Top
KD1204PFB1	V1	Top
TEST_POINT	X1	Top
TEST_POINT	X2	Top

TEST_POINT	X3	Top
TEST_POINT	X4	Top
TEST_POINT	X5	Top
TEST_POINT	X6	Top
TEST_POINT	X7	Top
TP_GND_4.0MM	X8	Top
TEST_POINT	X9	Top
TEST_POINT	X10	Top
TEST_POINT	X11	Top
TP_GND_4.0MM	X12	Top
TEST_POINT	X13	Top
TEST_POINT	X14	Top
TEST_POINT	X15	Top
TEST_POINT	X16	Top
TEST_POINT	X17	Top
TEST_POINT	X18	Top
TEST_POINT	X19	Top
TEST_POINT	X20	Top
TEST_POINT	X21	Top
TEST_POINT	X22	Top
TEST_POINT	X23	Top
TEST_POINT	X24	Top
TEST_POINT	X25	Top

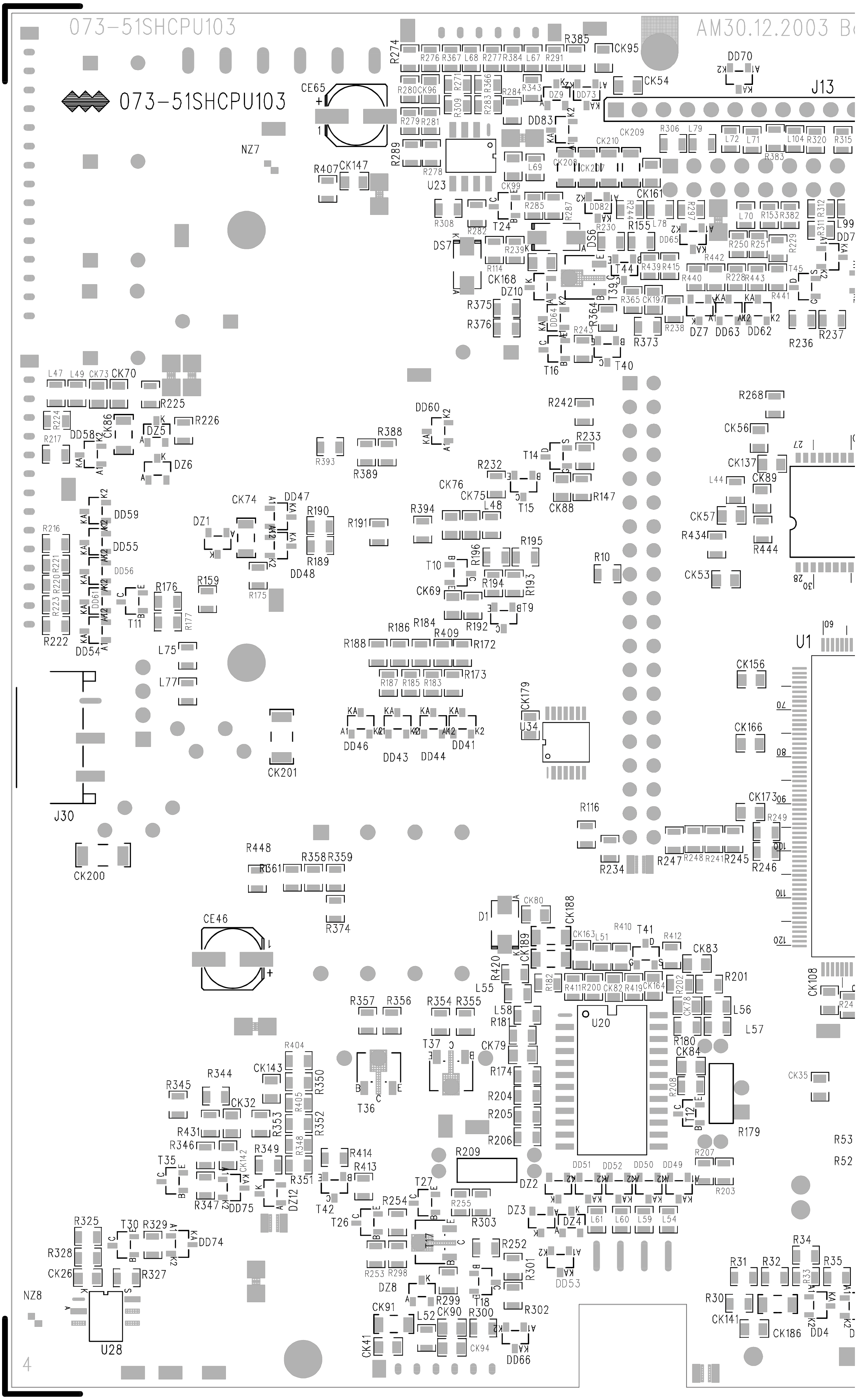
ESRO-30x8XX0	SRO1,2
ECHL-DO1XX1	CHL2,3
EIPA-GL530XX0	IPA1,2
EKON-IB2XX0	KON1,2
EMAT-M3ZnXX0	MAT1-3
EMTR-WLPSILPXX0	MTR1
EPOD-3XX1	POD1,2,6
EPOD-3VEJIRXX0	POD3,4
EPOD-3PRUZXX0	POD5
ESRO-M3x8XX2	SRO3,4
ESRO-M3x10XX1	SRO5

ECK+470P50VXXJ	CK500

PART TYPE	Reference	Side
EDD+BAV99XX0	DD1	Bottom
EDD+BAV99XX0	DD2	Bottom
EDD+BAV99XX0	DD3	Bottom
EDD+BAV99XX0	DD4	Bottom
EJ-89400-07XX0	J1	Bottom
TEST_POINT	J2	Bottom
TEST_POINT	J3	Bottom
TEST_POINT	J4	Bottom
TEST_POINT	J5	Bottom
TEST_POINT	J6	Bottom
TEST_POINT	J7	Bottom
TEST_POINT	J8	Bottom
MTHOLE3.2_NONPLATED	MH1	Top
NAVADECI_ZNACKA_BUTTERFLY	NZ1	Bottom
EPI-GP2S40XX0	PI1	Top
EPI-GP2S40XX0	PI2	Top
ER+100R0.1WXXF	R1	Bottom
ER+220R0.1WXXF	R2	Bottom
ER+100R0.1WXXF	R3	Bottom
ER+220R0.1WXXF	R4	Bottom
SESAZOVACI_ZNACKA	SZ1	Top
SESAZOVACI_ZNACKA	SZ2	Top
SESAZOVACI_ZNACKA	SZ3	Top

073-65leds101

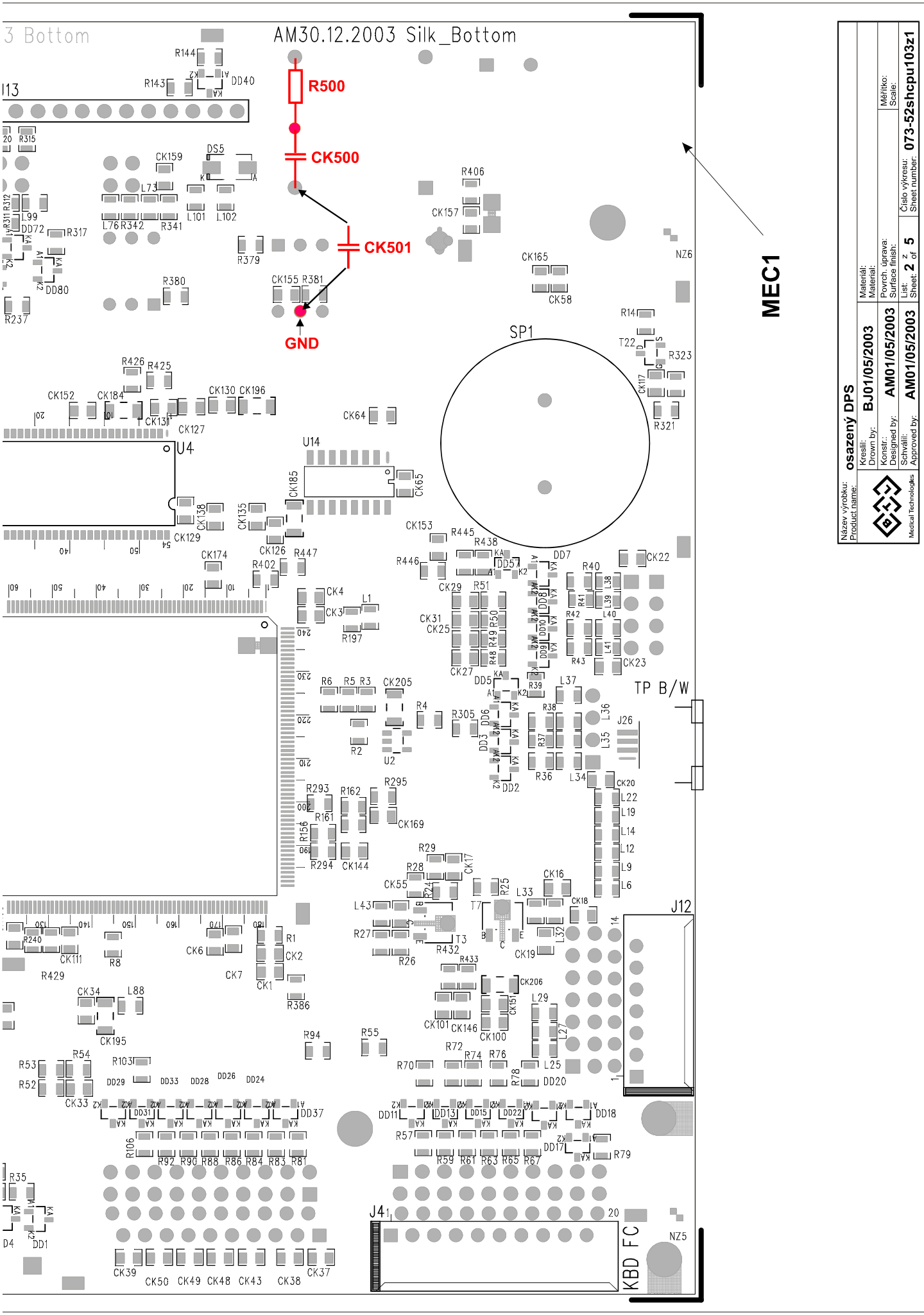
PART TYPE	Reference	Side
ECK-100N63VXXM	CK1	Bottom
ECK-100N63VXXM	CK2	Bottom
EDL-3MMGREENXX0	DL1	Top
EDL-3MMGREENXX0	DL2	Top
EDL-3MMYELOWXX0	DL3	Top
EDL-3MMYELOWXX0	DL4	Top
EJ-89400-07XX0	J1	Bottom
EJ-B02-VHJS0	J2	Bottom
MTHOLE3.2_NONPLATED	MH1	Top
MTHOLE3.2_NONPLATED	MH2	Top
SESAZOVACI_ZNACKA	SZ1	Top
SESAZOVACI_ZNACKA	SZ2	Top
SESAZOVACI_ZNACKA	SZ3	Top

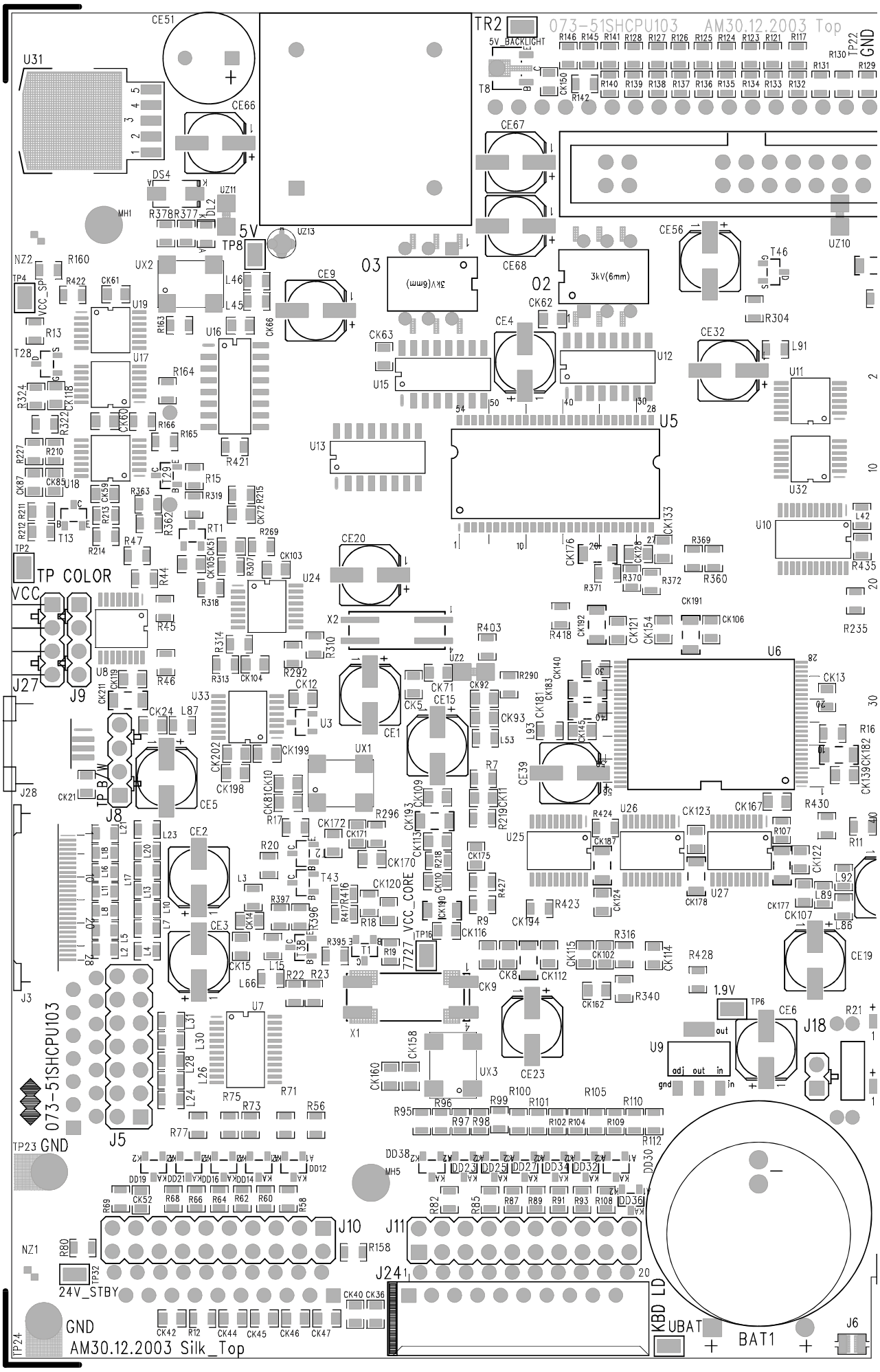


Změna: Change No.:	Popis změny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pův. verze: Previous ver.:
z1	přidáno R500,CK500,501 k TR2 na stranu bottom	AM17/06/2004	AM17/06/2004	TN17/06/2004	103
V2	věcná změna	BJ30/12/2003	AM30/12/2003	JD30/12/2003	102z1

BTL Medical Technologies

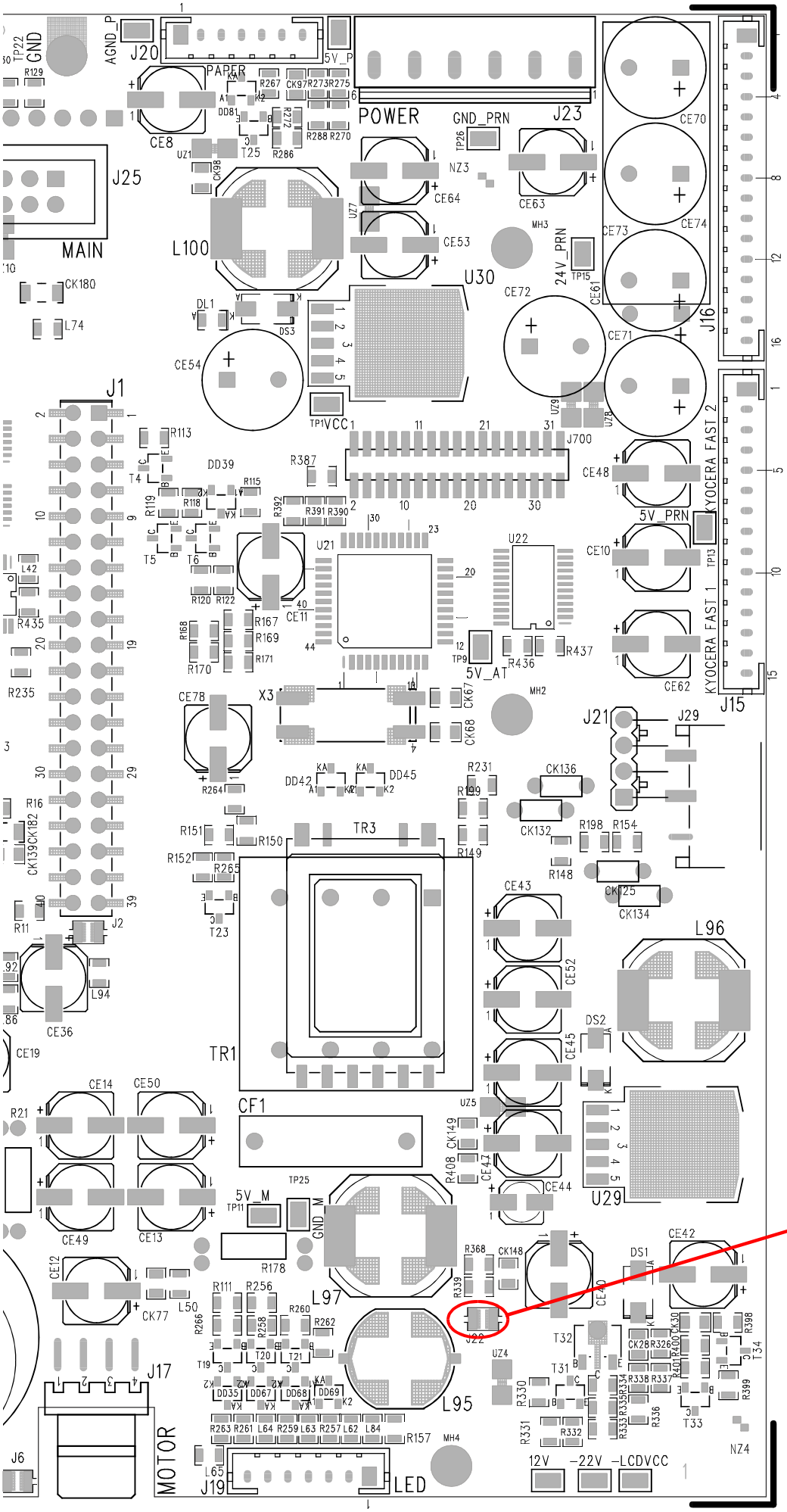
Název výrobku: Product name:	**osazený DPS**
Kreslil: Drawn by:	BJ01/05/2003
Konstr.: Designed by:	AM01/05/2003
Schválil: Approved by:	AM01/05/2003
Materiál: Material:	
Povrch. úprava: Surface finish:	
List: Sheet:	1 z of 5
Číslo výkresu: Sheet number:	073-52shcpu103z1
Měřítko: Scale:	


3 Bottom
AM30.12.2003 Silk_Bottom
R500
CK500
CK501
GND
MEC1
SP1
U4
U14
U2
J12
J4
KBD FC
TP B/W
NZ5
NZ6
Název výrobku:
Product name:
osazený DPS
Kreslil:
Drown by:
BJ01/05/2003
Konstr.:
Designed by:
AM01/05/2003
Schválil:
Approved by:
AM01/05/2003
Medical Technologies
Materiál:
Material:
Povrch. úprava:
Surface finish:
Měřítko:
Scale:
List:
Sheet:
2
of
5
Číslo výkresu:
Sheet number:
073-52shcpu103z1



Název výrobku: Product name:	**osazený DPS**		
Kreslil: Drawn by:	**BJ01/05/2003**	Materiál: Material:	
Konstr.: Designed by:	**AM01/05/2003**	Povrch. úprava: Surface finish:	
Schválil: Approved by:	**AM01/05/2003**	List: Sheet:	**3** z of **5**
		Číslo výkresu: Sheet number:	**073-52shcpu103z1**
		Měřítko: Scale:	

Medical Technologies

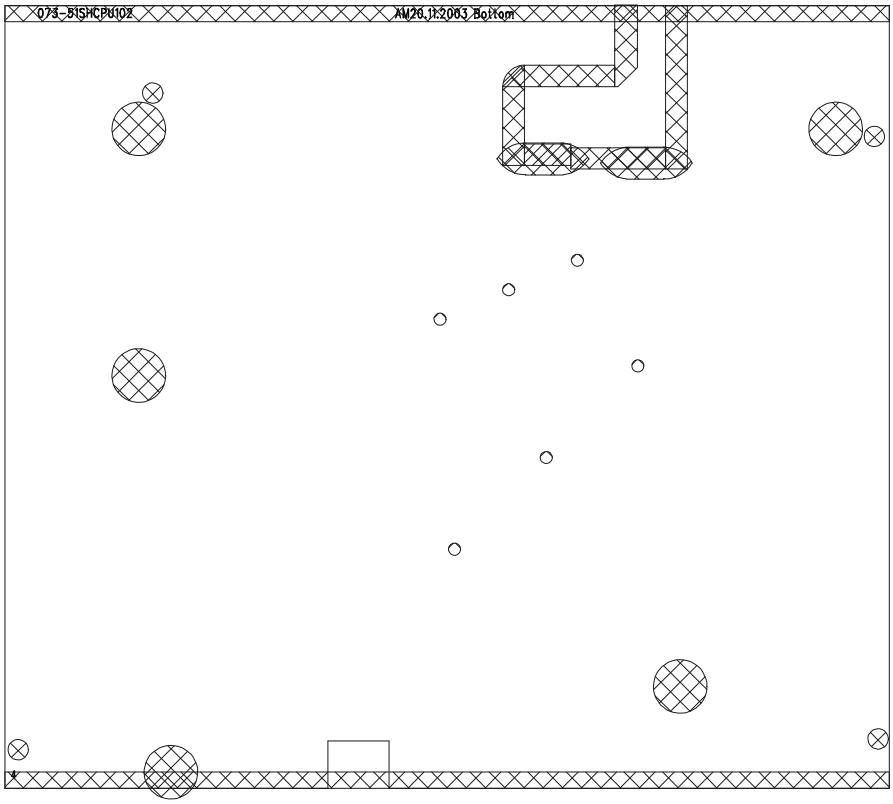


Název výrobku: / Product name:	osazený DPS
Kreslil: / Drown by:	BJ01/05/2003
Konstr.: / Designed by:	AM01/05/2003
Schválil: / Approved by:	AM01/05/2003
Materiál: / Material:	
Povrch. úprava: / Surface finish:	
List: / Sheet:	4 z 5
Číslo výkresu: / Sheet number:	073-52shcpu103z1
Měřítko: / Scale:	

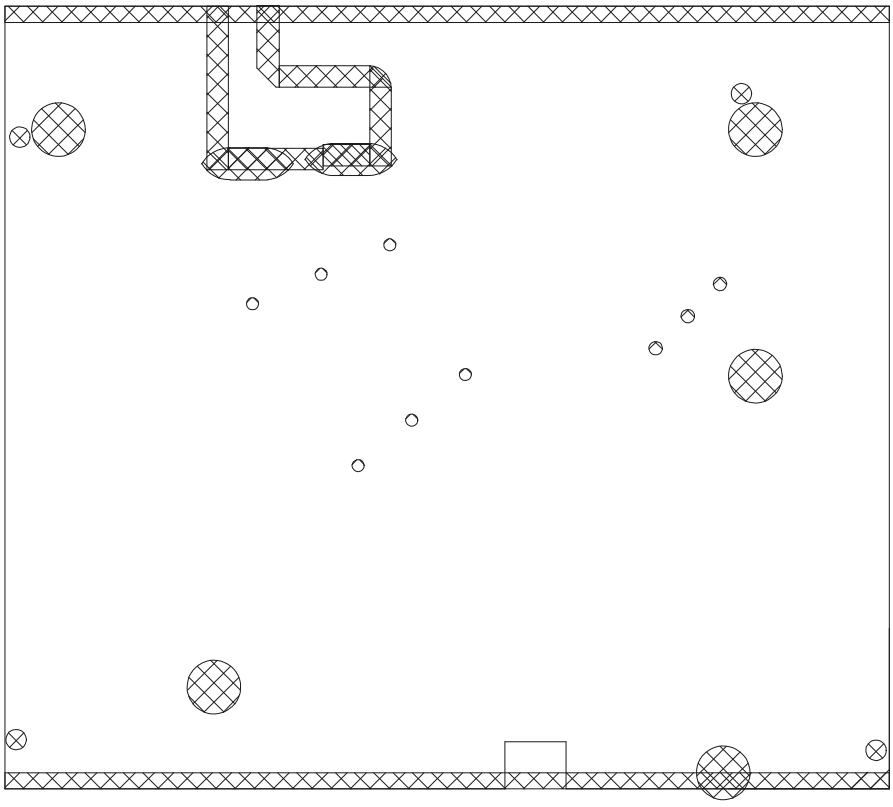
Medical Technologies

izolační bariéry

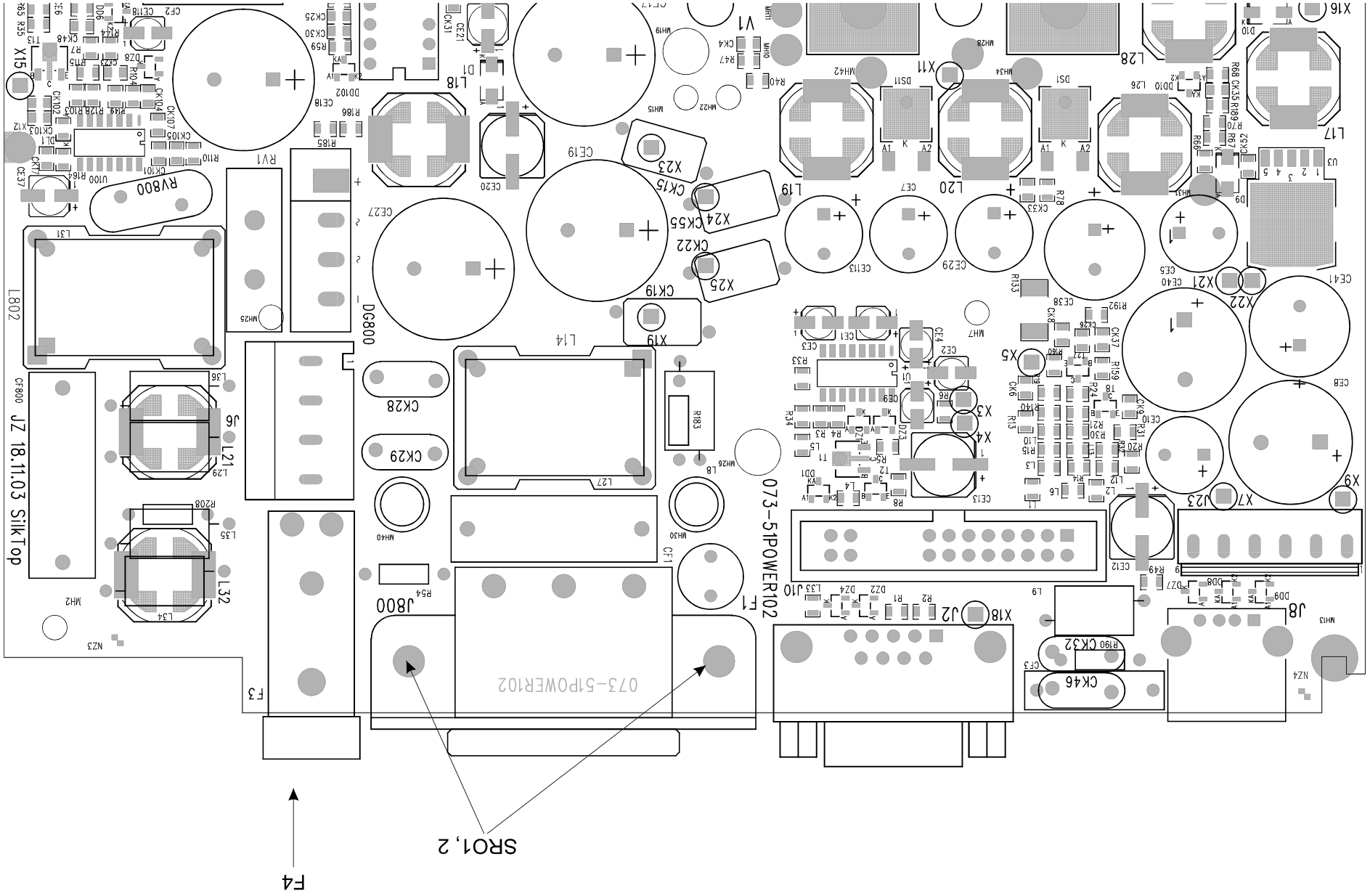
BOTTOM



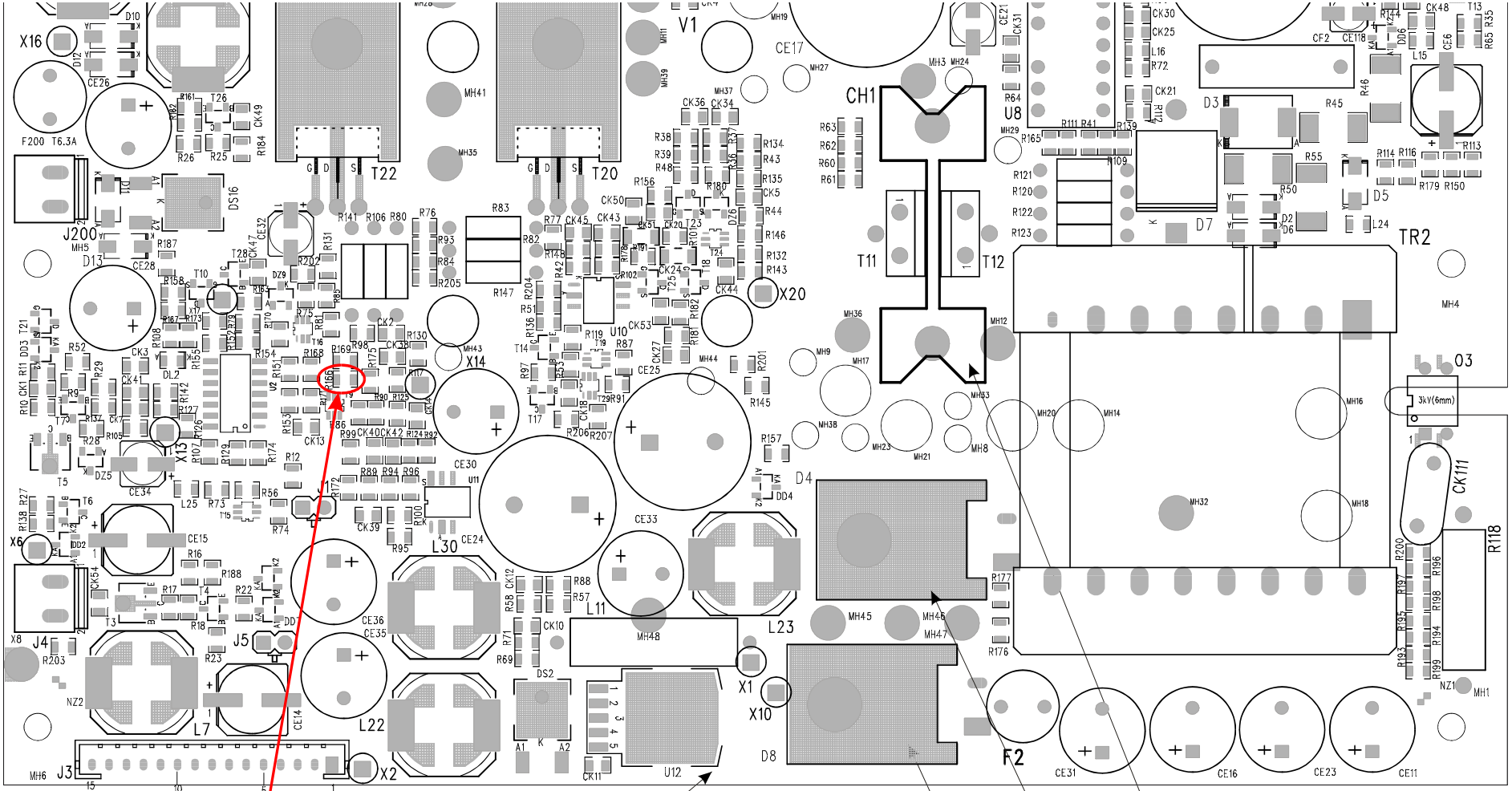
TOP

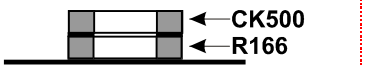


Název výrobku: Product name:	**osazený DPS**			
Medical Technologies	Kreslil: Drown by: **BJ01/05/2003**	Materiál: Material:		
	Konstr.: Designed by: **AM01/05/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **AM01/05/2003**	List: **5** z Sheet: **5** of	Číslo výkresu: Sheet number:	**073-52shcpu103z1**



Název výrobku: Product name:	**osazený DPS**		
Medical Technologies	Kreslil: Drown by: **BJ15/07/2003**	Materiál: Material:	
	Konstr.: Designed by: **AM15/07/2003**	Povrch. úprava: Surface finish:	Měřítko: Scale:
	Schválil: Approved by: **JD15/07/2003**	List: Sheet: **2** z or **6**	Číslo výkresu: Sheet number: **073-52power102z2**

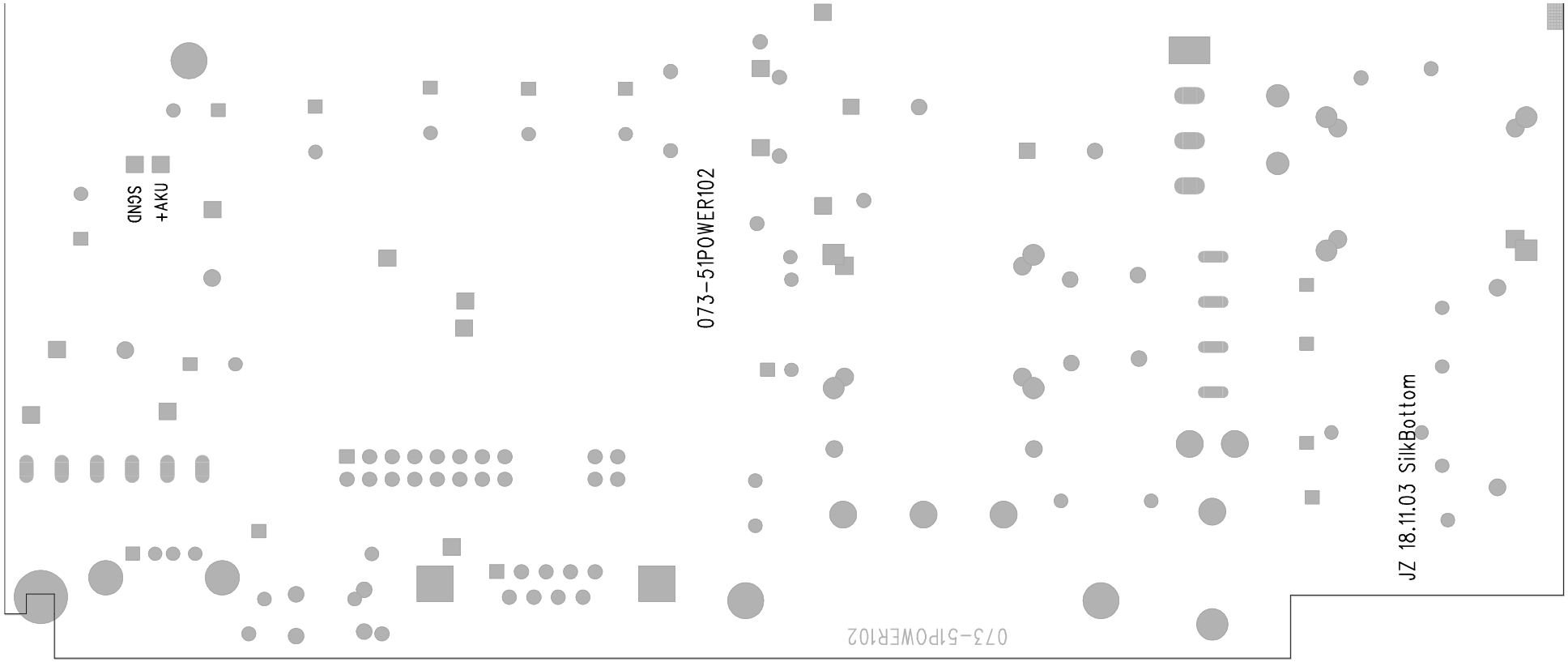


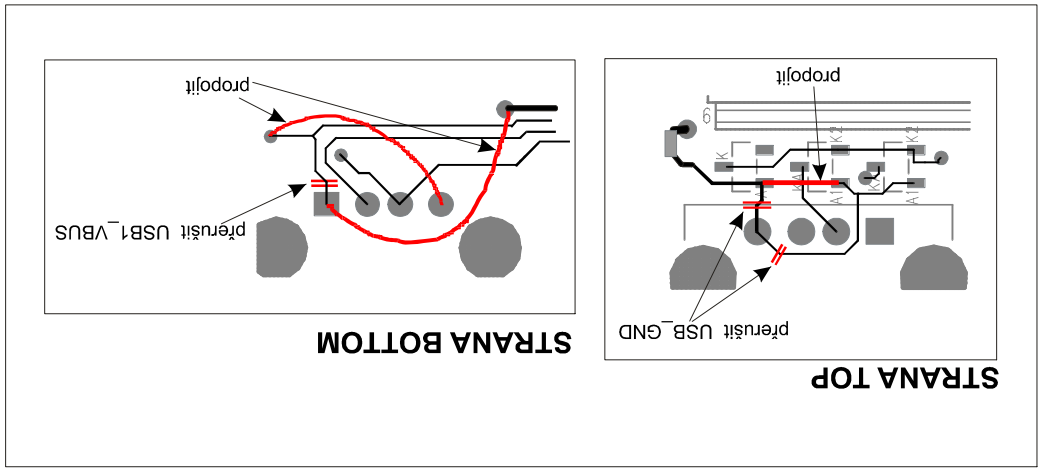


pájet CK500 paralelně k R166/
solder CK500 in parallel on R166

Změna: Change No.:	Popis změny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pův. verze: Previous ver.:
z2	pájet CK500 paralelně k R166	AM21/06/2004	AM21/06/2004	TN21/06/2004	102z1
z1	úprava zapojení konektoru J8	AM23/03/2004	AM23/03/2004	JD23/03/2004	102
V1	věcná změna	BJ19/11/2003	AM19/11/2003	JD19/11/2003	101z1
z1	přidán R500,501,T500,KAB500 propojeni krytu J2,7,8 s GND	BJ18/08/2003	AM18/08/2003	JD18/08/2003	101

Název výrobku: Product name:	osazený DPS			
Medical Technologies	Kreslil: Drown by: BJ15/07/2003	Materiál: Material:		
	Konstr.: Designed by: AM15/07/2003	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: JD15/07/2003	List: Sheet: 1 z of 6	Číslo výkresu: Sheet number:	073-52power102z2





ÚPRAVA ZAPOJENÍ USB KONEKTORU J8

Název výrobku: Product name:	**osazený DPS**			
Medical Technologies	Kreslil: Drown by: **BJ15/07/2003**	Materiál: Material:		
	Konstr.: Designed by: **AM15/07/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD15/07/2003**	List: **4** z Sheet: **4** of **6**	Číslo výkresu: Sheet number:	**073-52power102z2**

Název výrobku: Product name: **osazený DPS**				
Medical Technologies	Kreslil: Drown by: **BJ15/07/2003**	Materiál: Material:		
	Konstr.: Designed by: **AM15/07/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD15/07/2003**	List: **3** z Sheet: **3** of **6**	Číslo výkresu: Sheet number:	**073-52power102z2**

Název výrobku: Product name:	**osazený DPS**			
Kreslil: Drown by:	**BJ15/07/2003**	Materiál: Material:		
Konstr.: Designed by:	**AM15/07/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
Schválil: Approved by:	**JD15/07/2003**	List: Sheet: **6** z of **6**	Číslo výkresu: Sheet number:	**073-52power10222**

Medical Technologies

montáž D4(8) k CHL2(3)

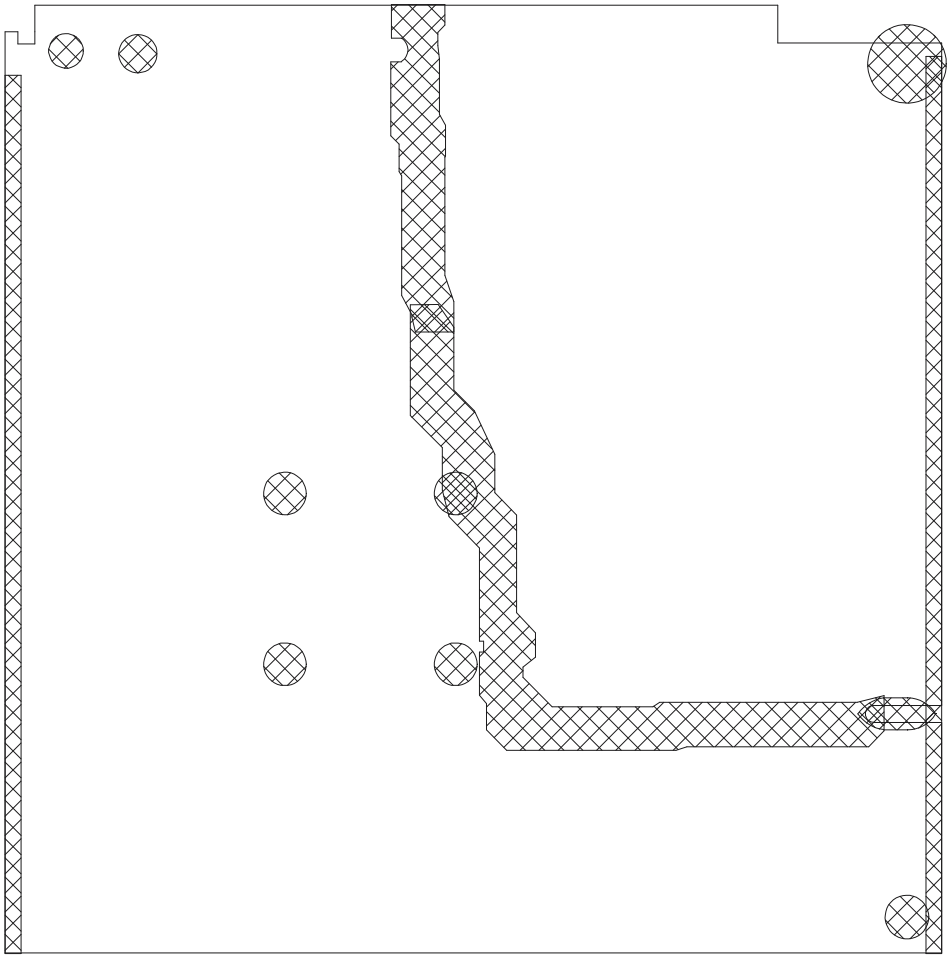
mezi D4(8) a CHL2(3)
je nanesena vrstva MTR1

montáž T11, T12 k CH1

mezi T11(12), IPA1(2) a CH1
je nanesena vrstva MTR1

izolační bariéry

TOP



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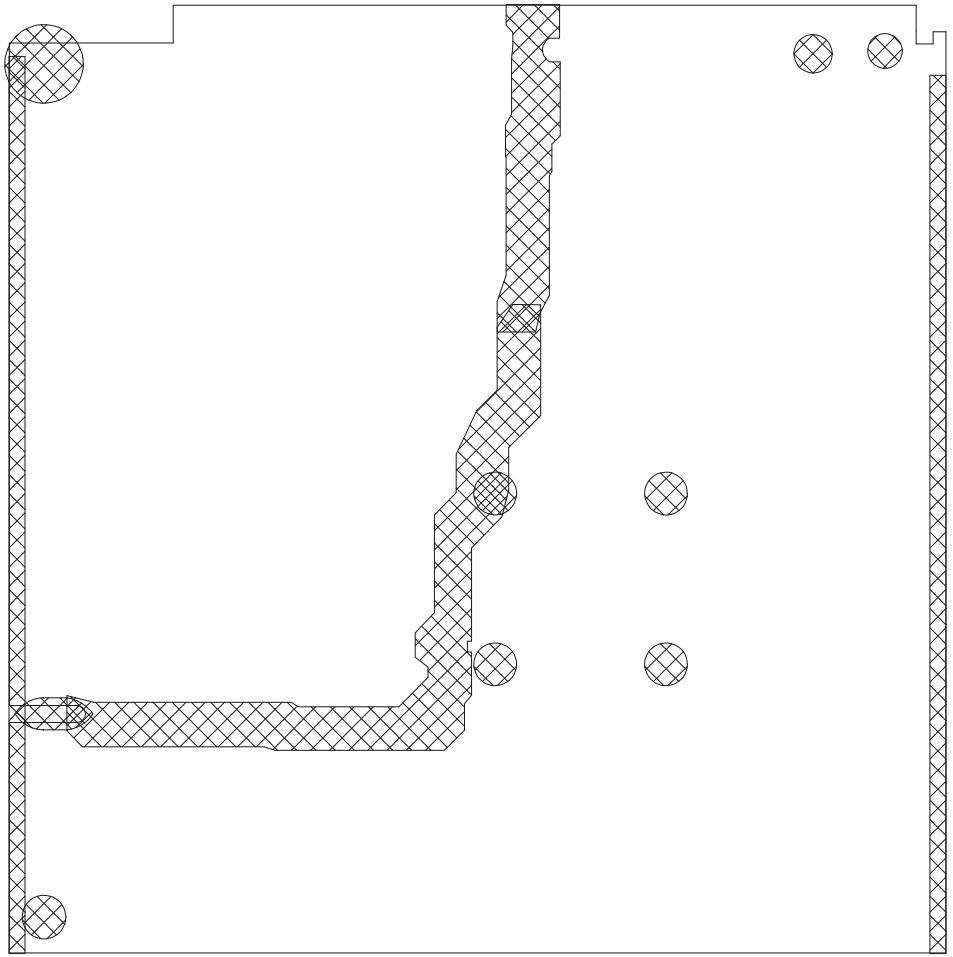

Název výrobku: Product name:	**osazený DPS**			
BTL Medical Technologies	Kreslil: Drown by: **BJ15/07/2003**	Materiál: Material:		
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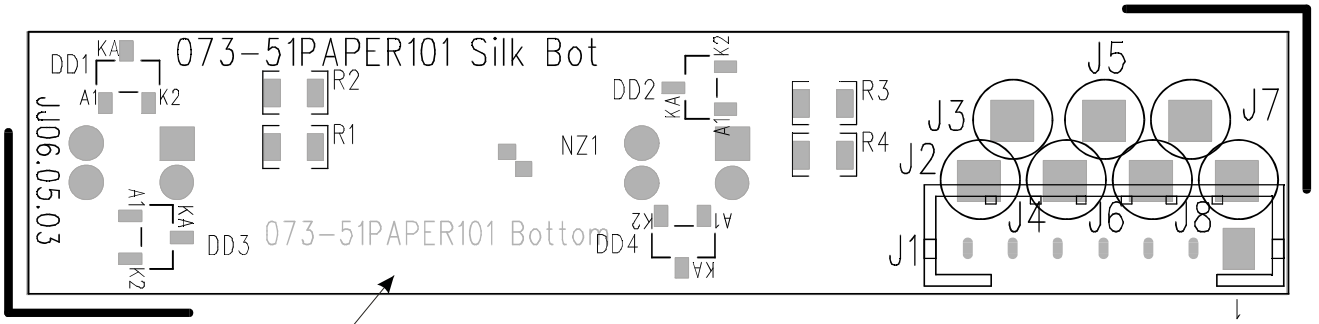

MEC1

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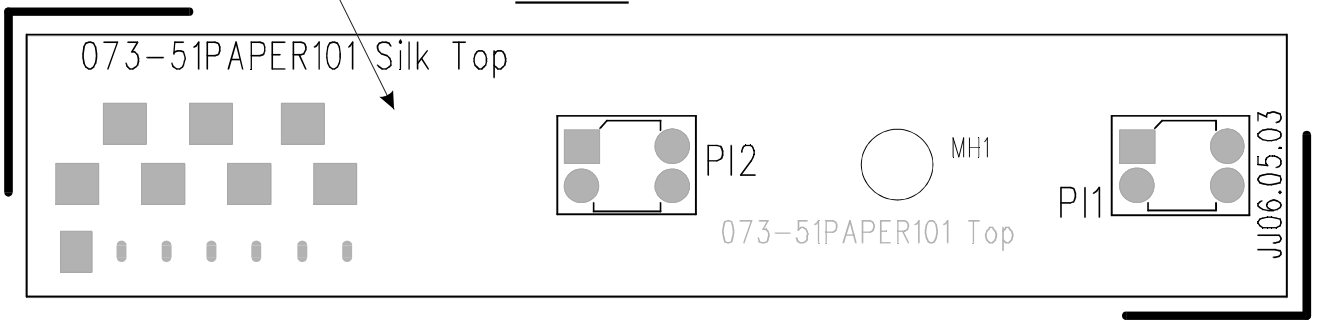

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Název výrobku: Product name:	**osazený DPS**			
Medical Technologies	Kreslil: Drown by: **BJ16/06/2003**	Materiál: Material:		
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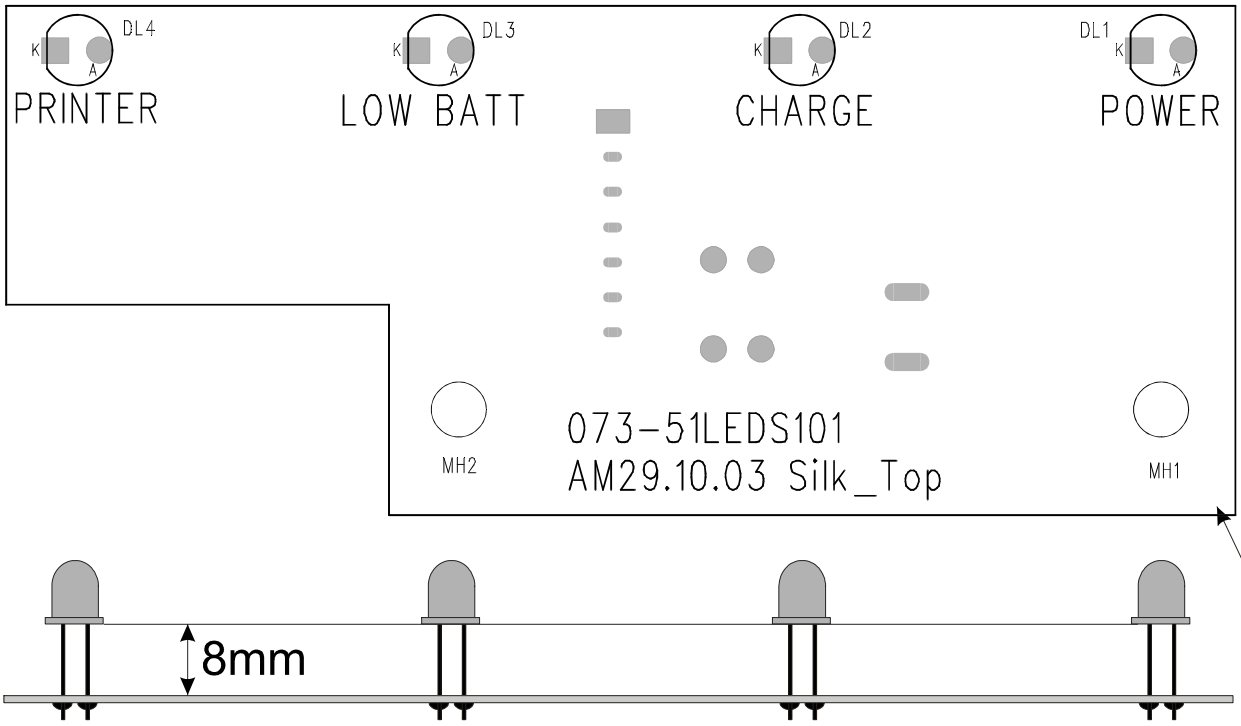

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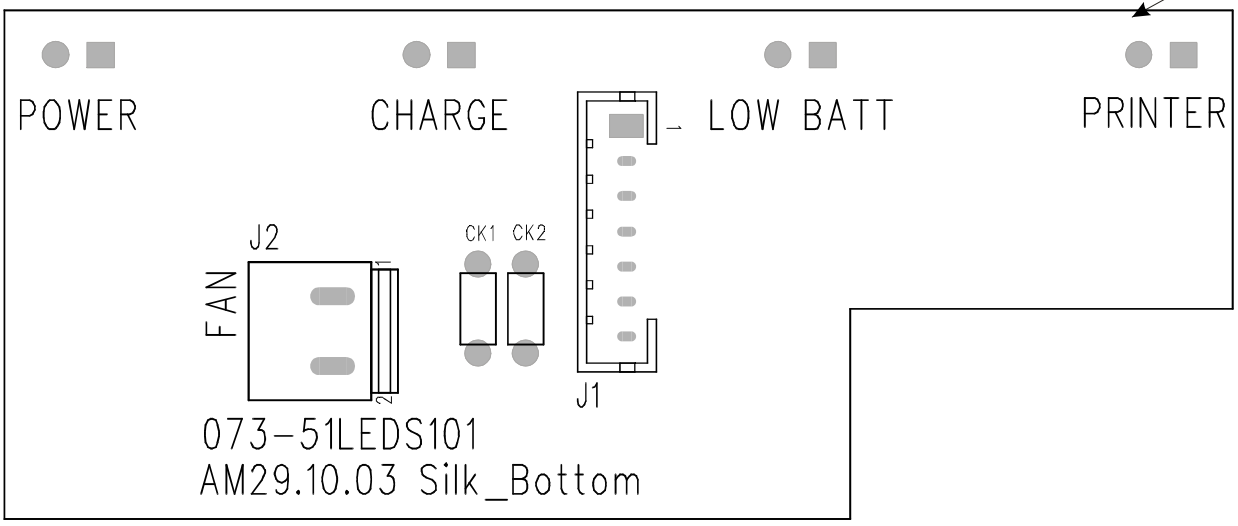

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V1	**věcná změna**	**BJ28/10/2003**	**AM28/10/2003**	**JD28/10/2003**	**100**

Název výrobku: Product name:	**osazený DPS**			
Medical Technologies	Kreslil: Drown by: **BJ16/06/2003**	Materiál: Material:		
	Konstr.: Designed by: **AM16/06/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
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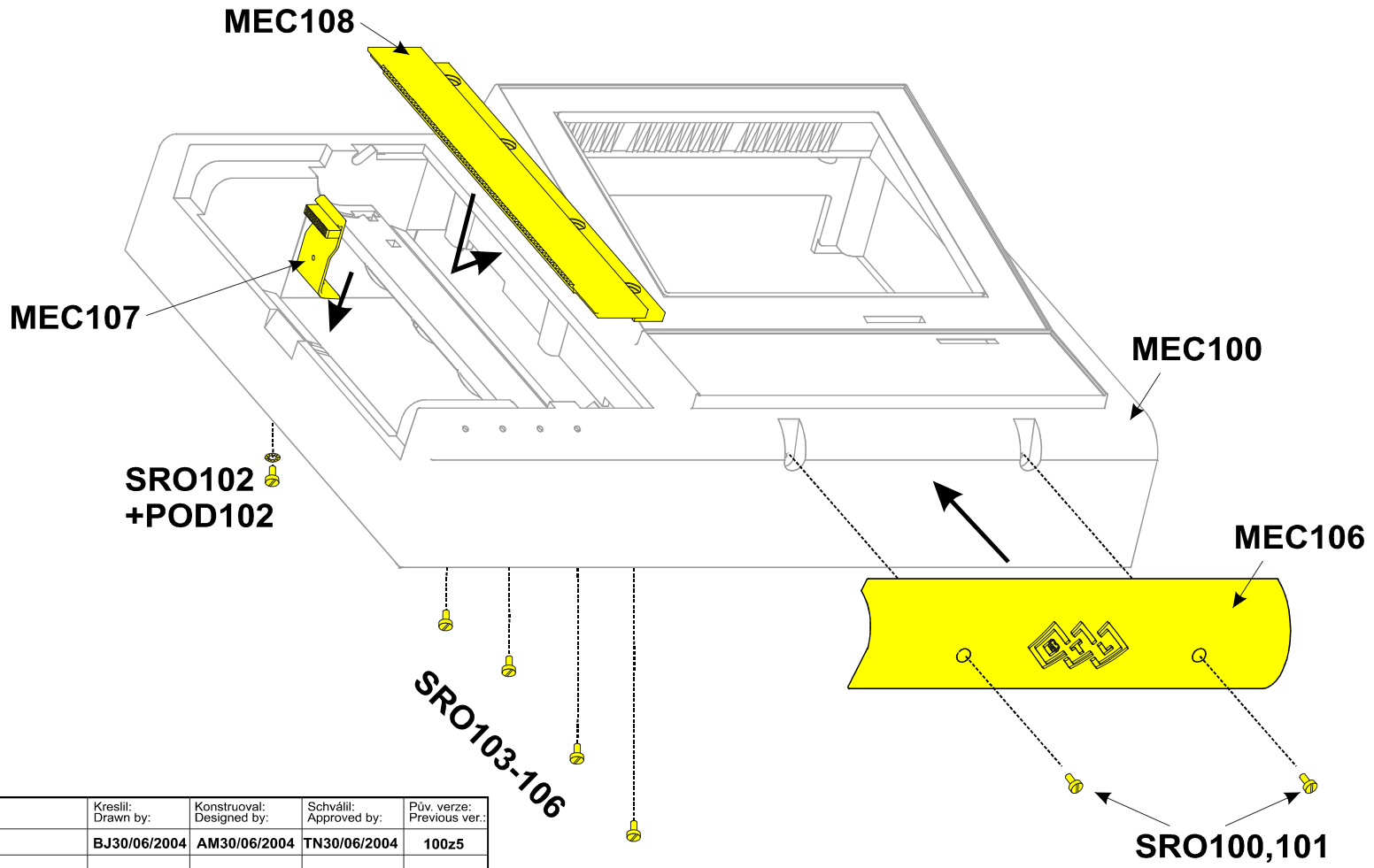

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z6	MEC42 added	BJ30/06/2004	AM30/06/2004	TN30/06/2004	100z5
z5	change of MEC10 and MEC14	BJ05/03/2004	AM05/03/2004	JD05/03/2004	100z4
z4	change in the step motor assembly	BJ28/10/2003	AM28/10/2003	JD28/10/2003	100z3
z3	SRO230 added, update SRO220-223	BJ03/10/2003	AM03/10/2003	JD03/10/2003	100z2
z2	modification of SRO202-208	BJ30/09/2003	AM30/09/2003	JD30/09/2003	100z1
z1	Fan assembly, MEC 41 added	BJ11/09 /2003	AM11/09 /2003	JD11/09 /2003	100

Název výrobku: Product name:	UNIT ASSEMBLY			
Medical Technologies	Kreslil: Drown by: BJ02/07/2003	Materiál: Material:		
	Konstr.: Designed by: AM02/07/2003	Povrch. úprava: Surface finish:		Měřítko: Scale:
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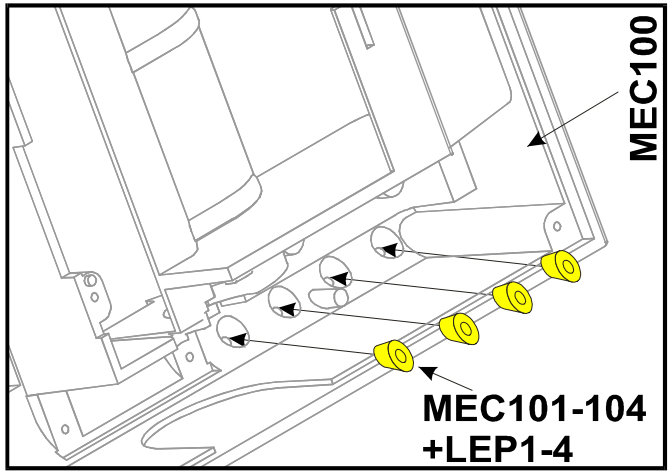

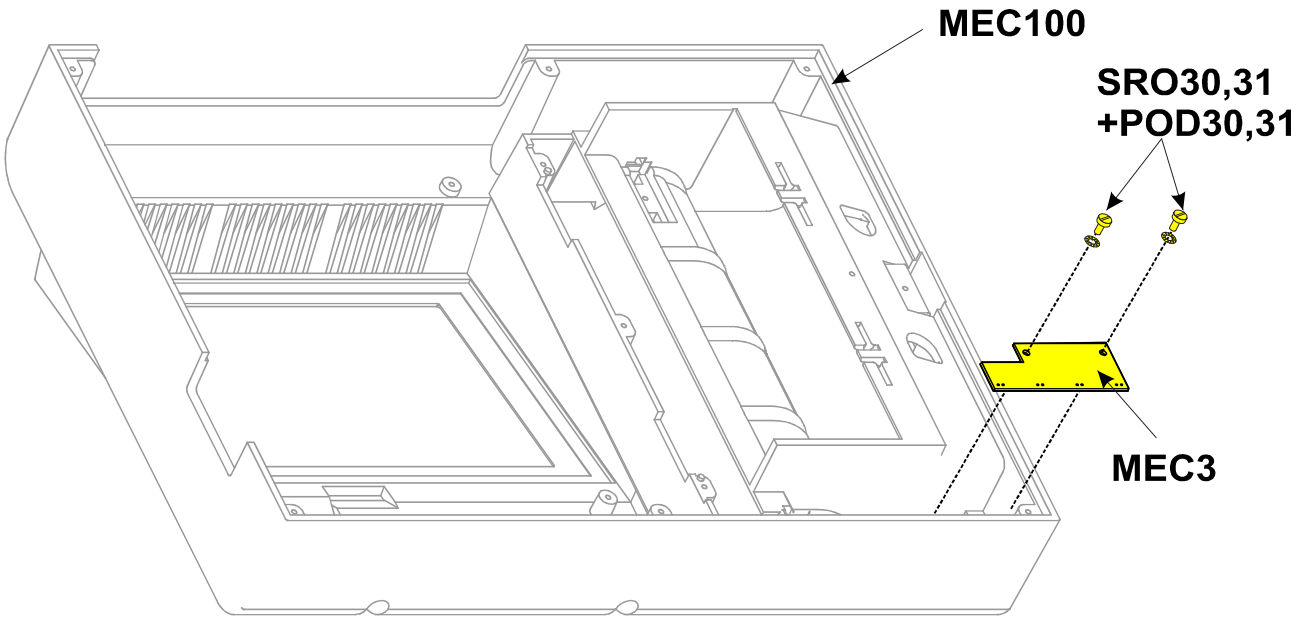

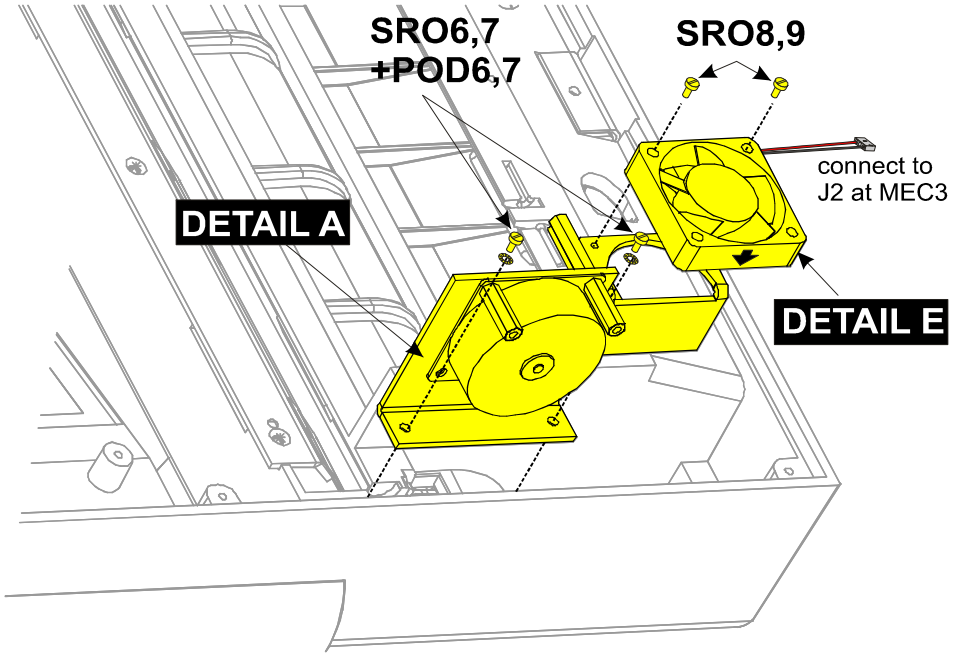

Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
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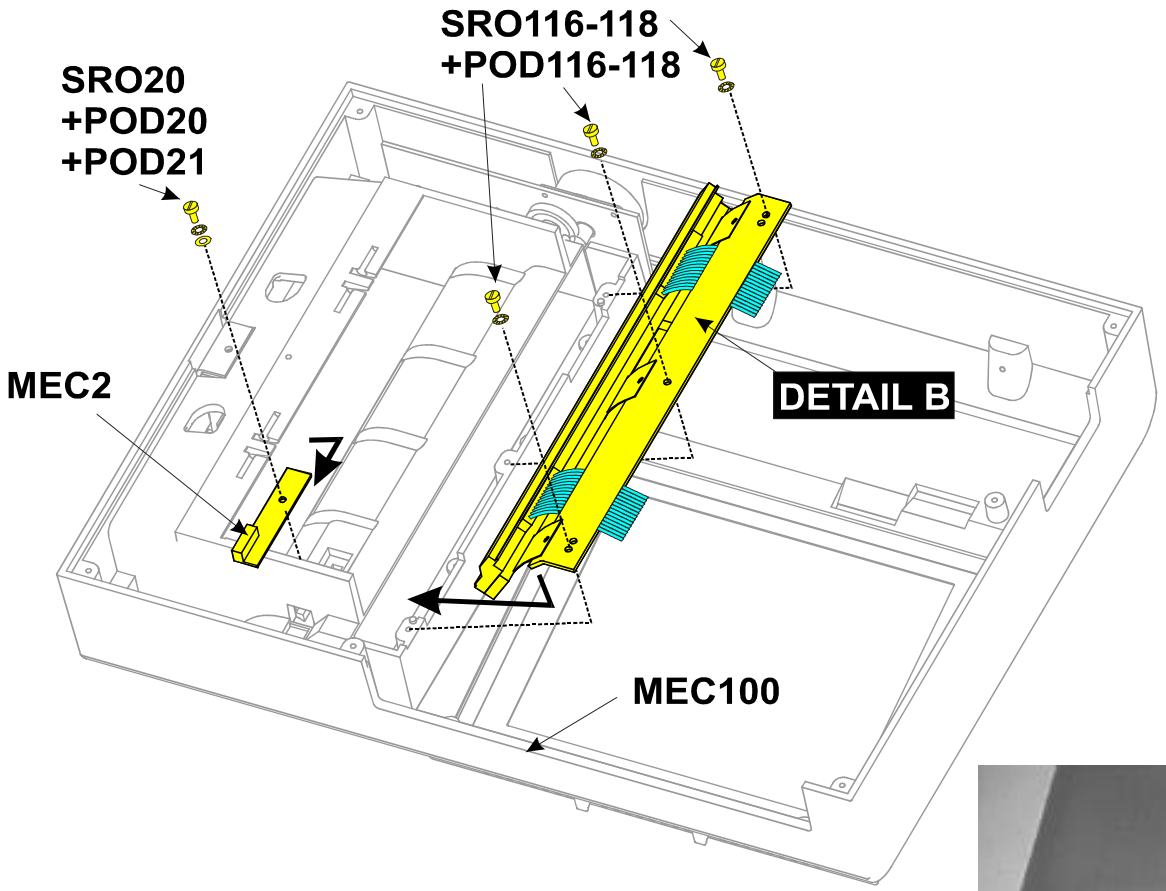

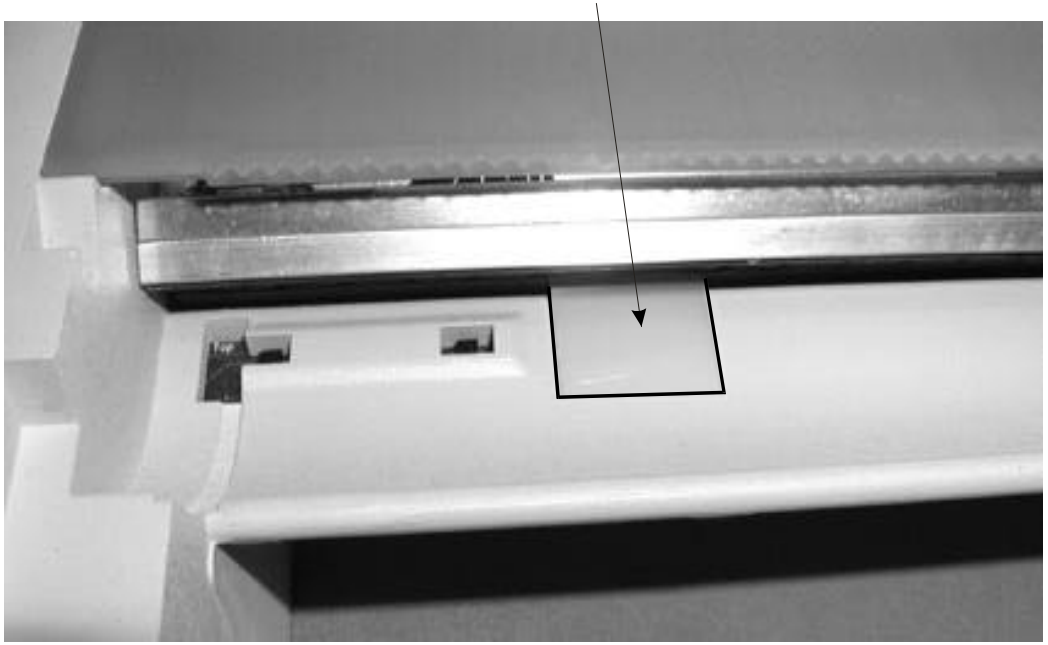

Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
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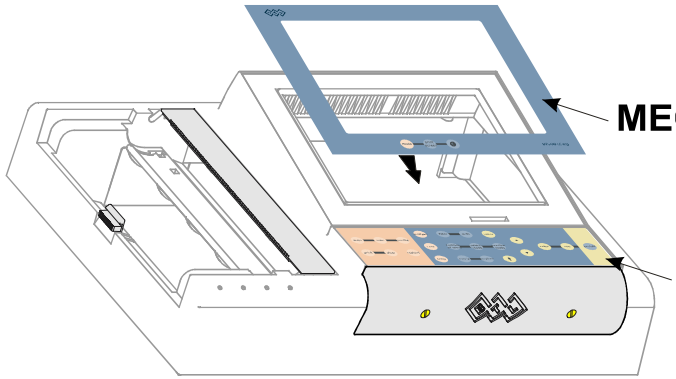

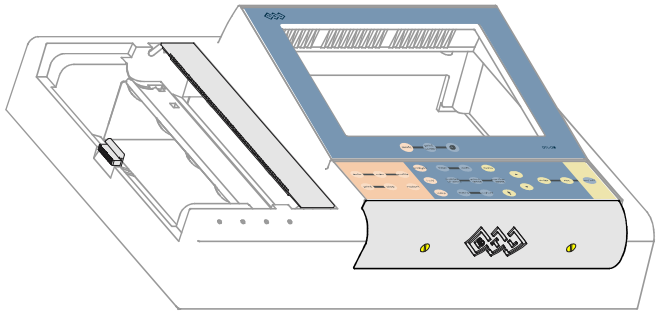

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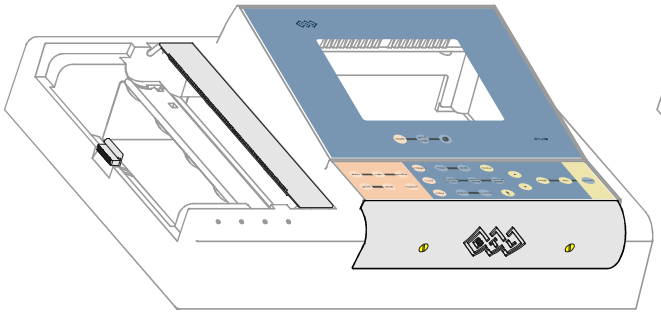

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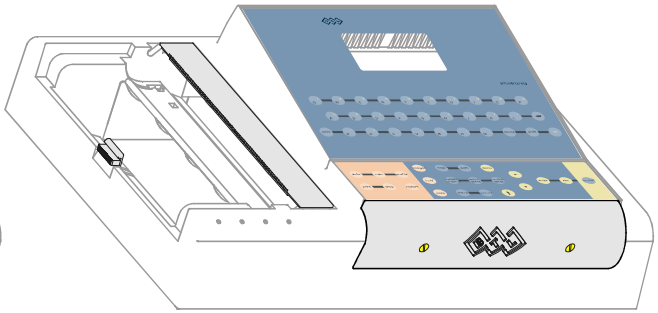

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Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
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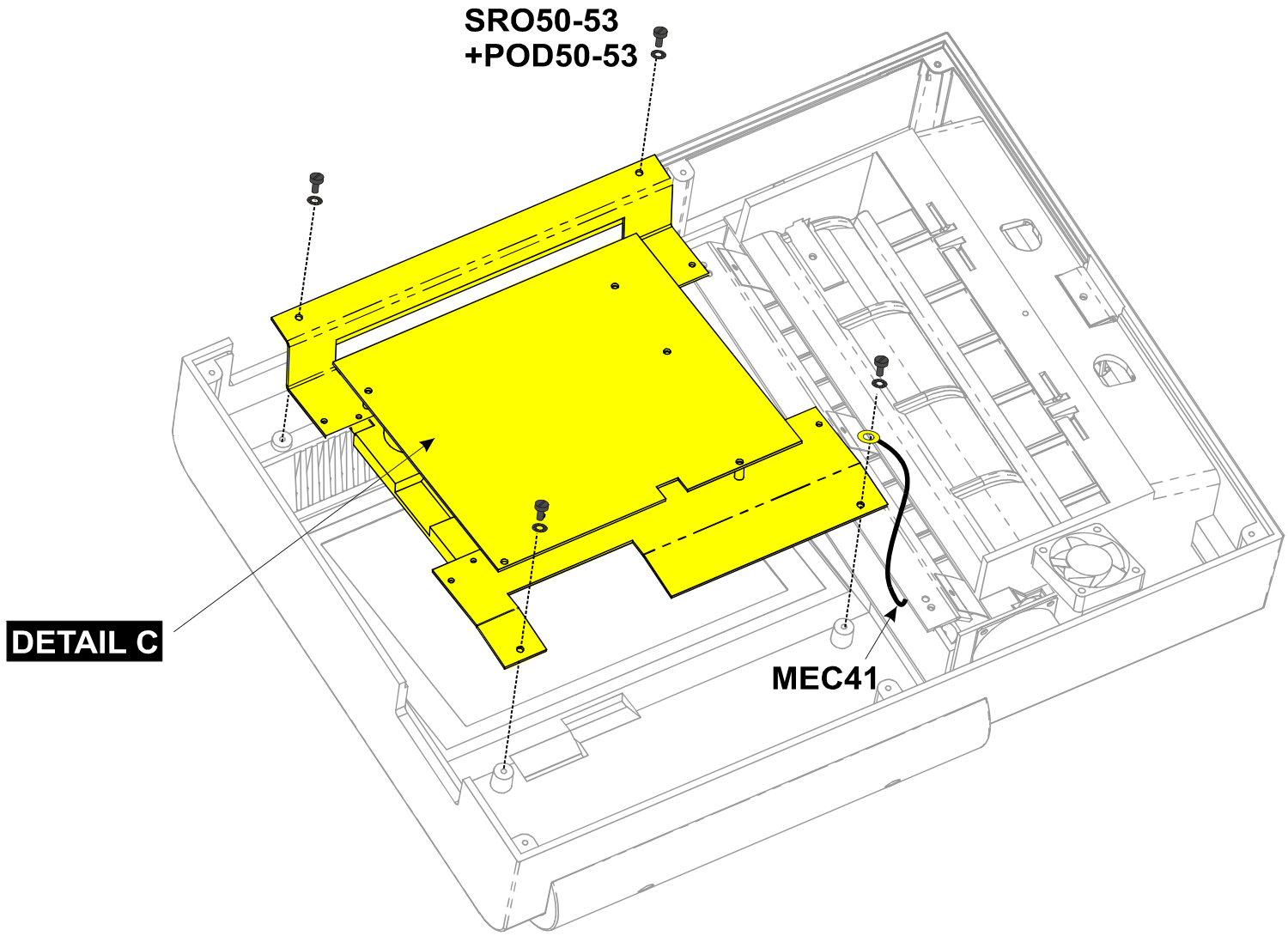

Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
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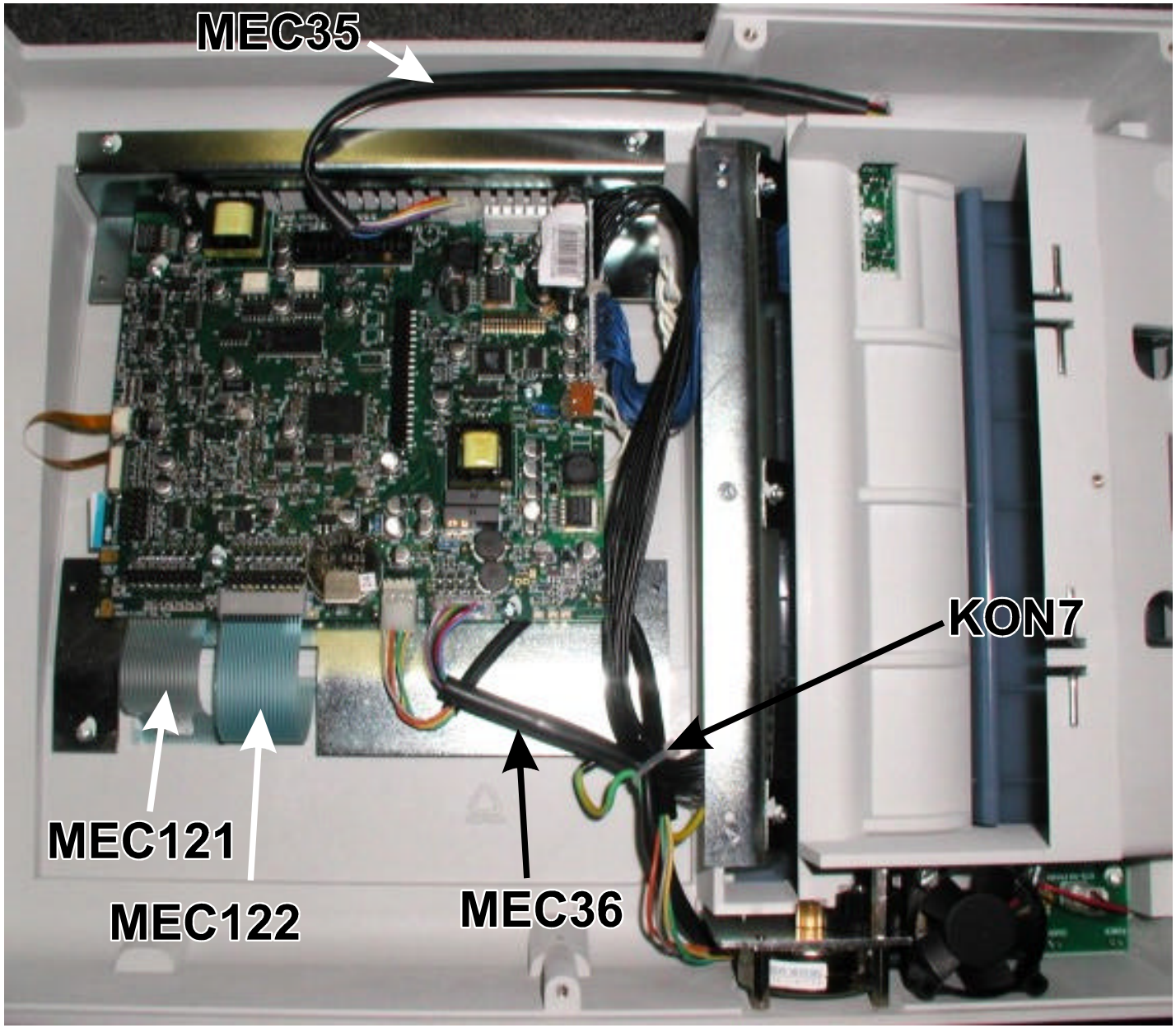

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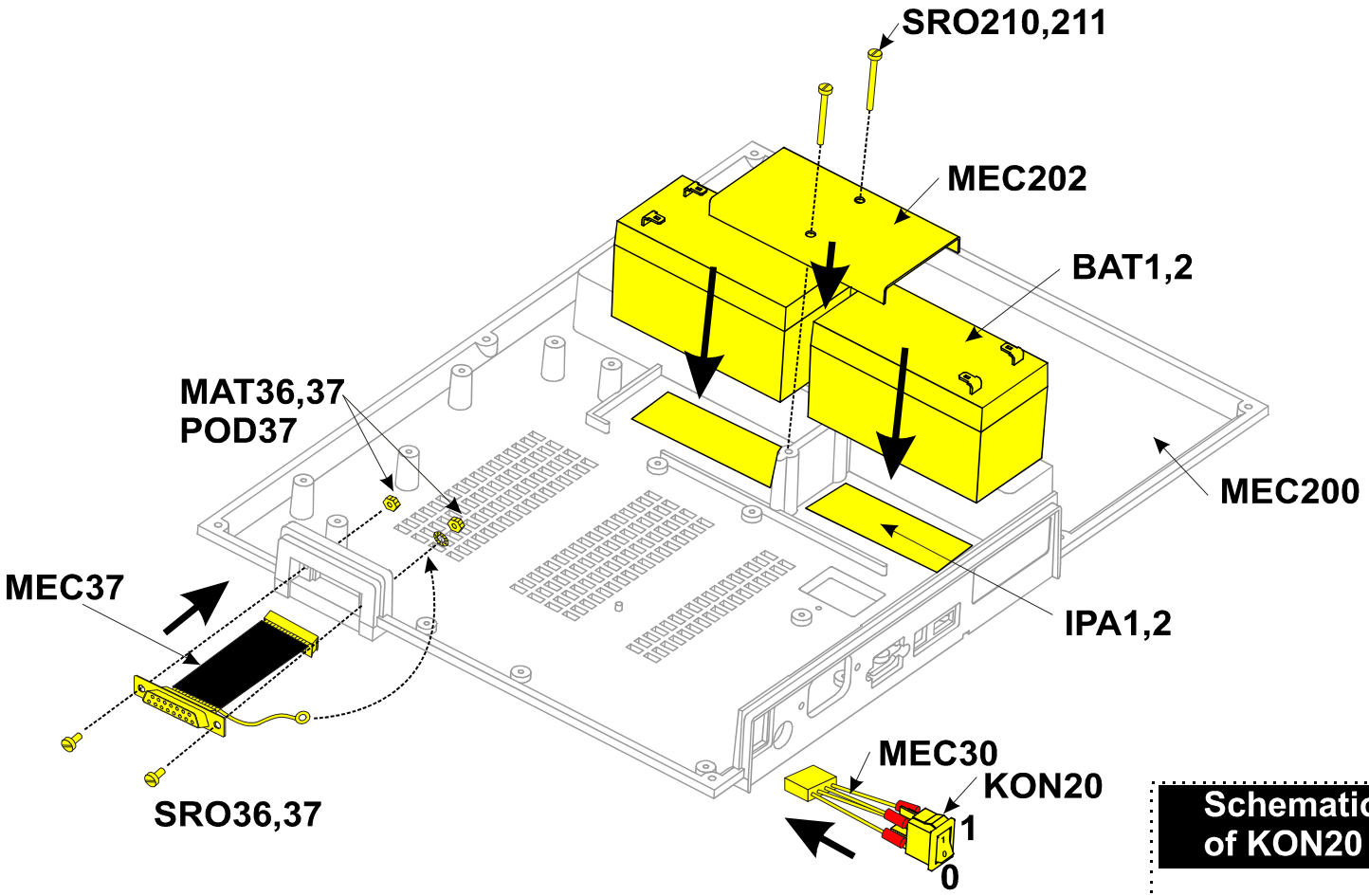
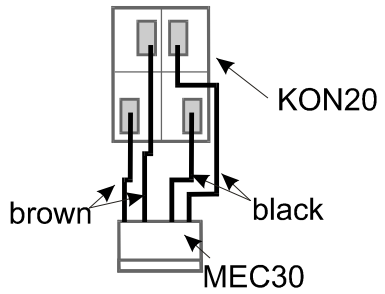
Medical Technologies	Schválil: Approved by: **JD02/07/2003**	List: Sheet: **6** z of **23**	Číslo výkresu: Sheet number: **073-pri100z6**



Schematic connection of KON20 and MEC30



Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
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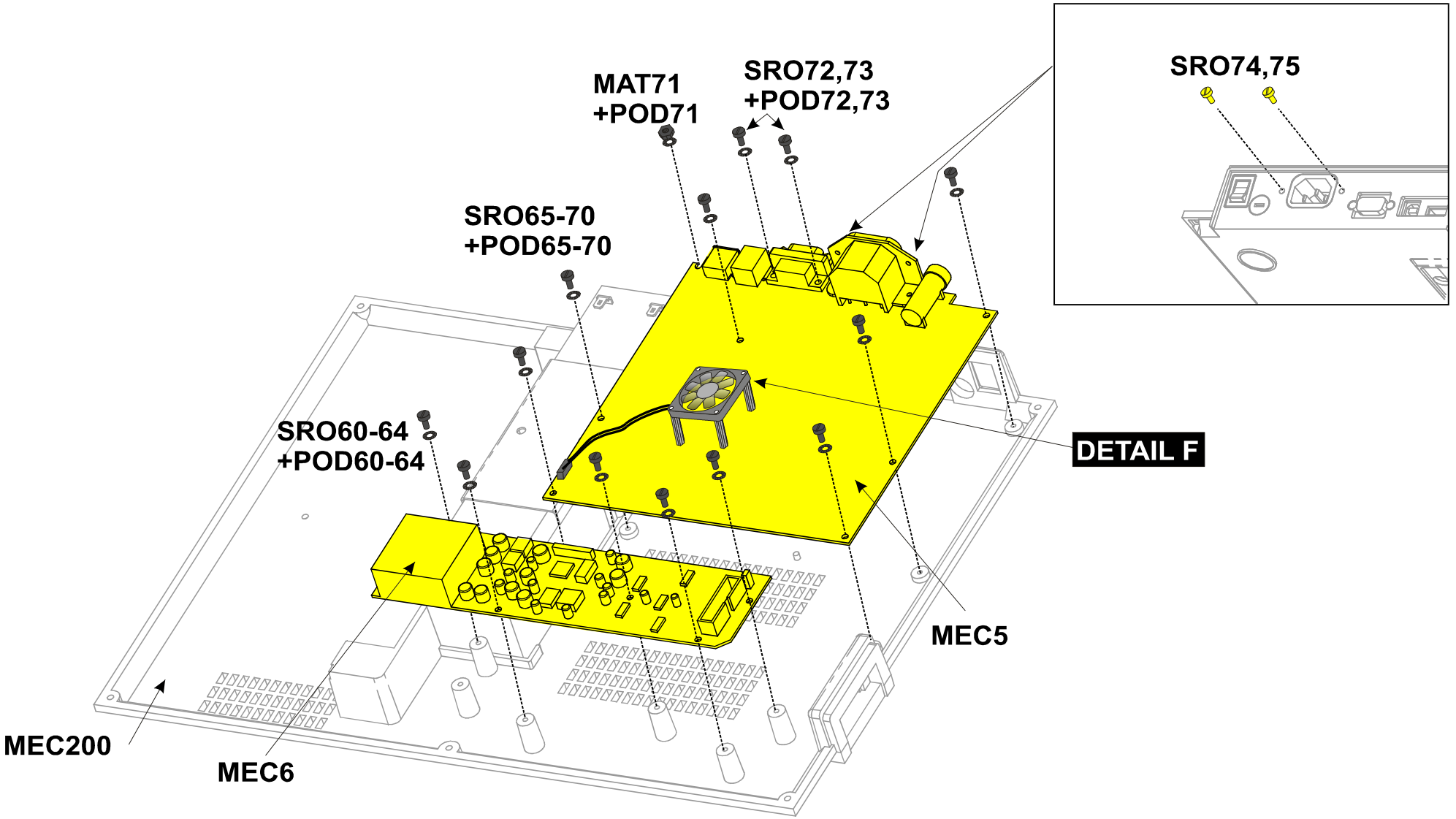

Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
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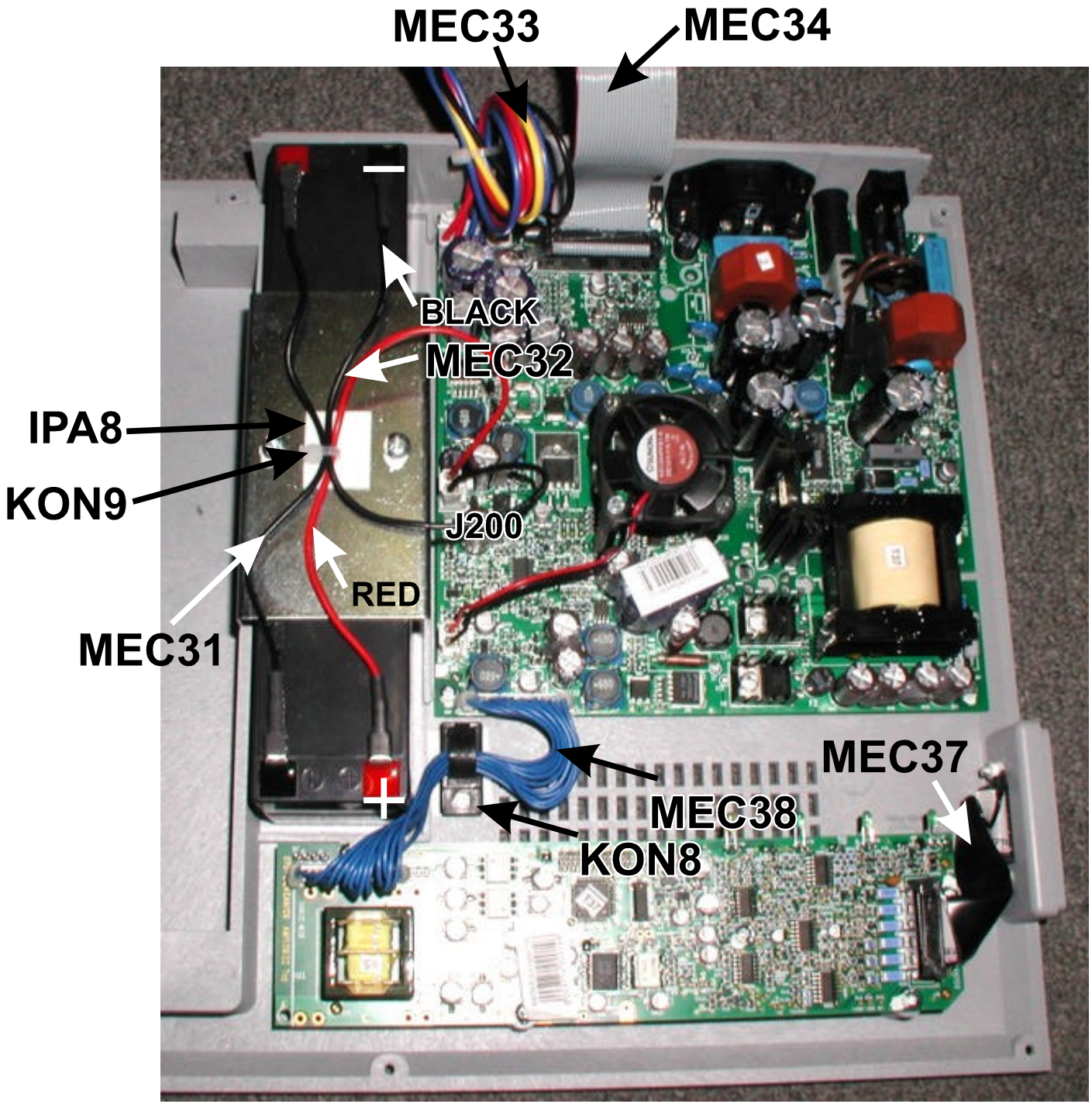

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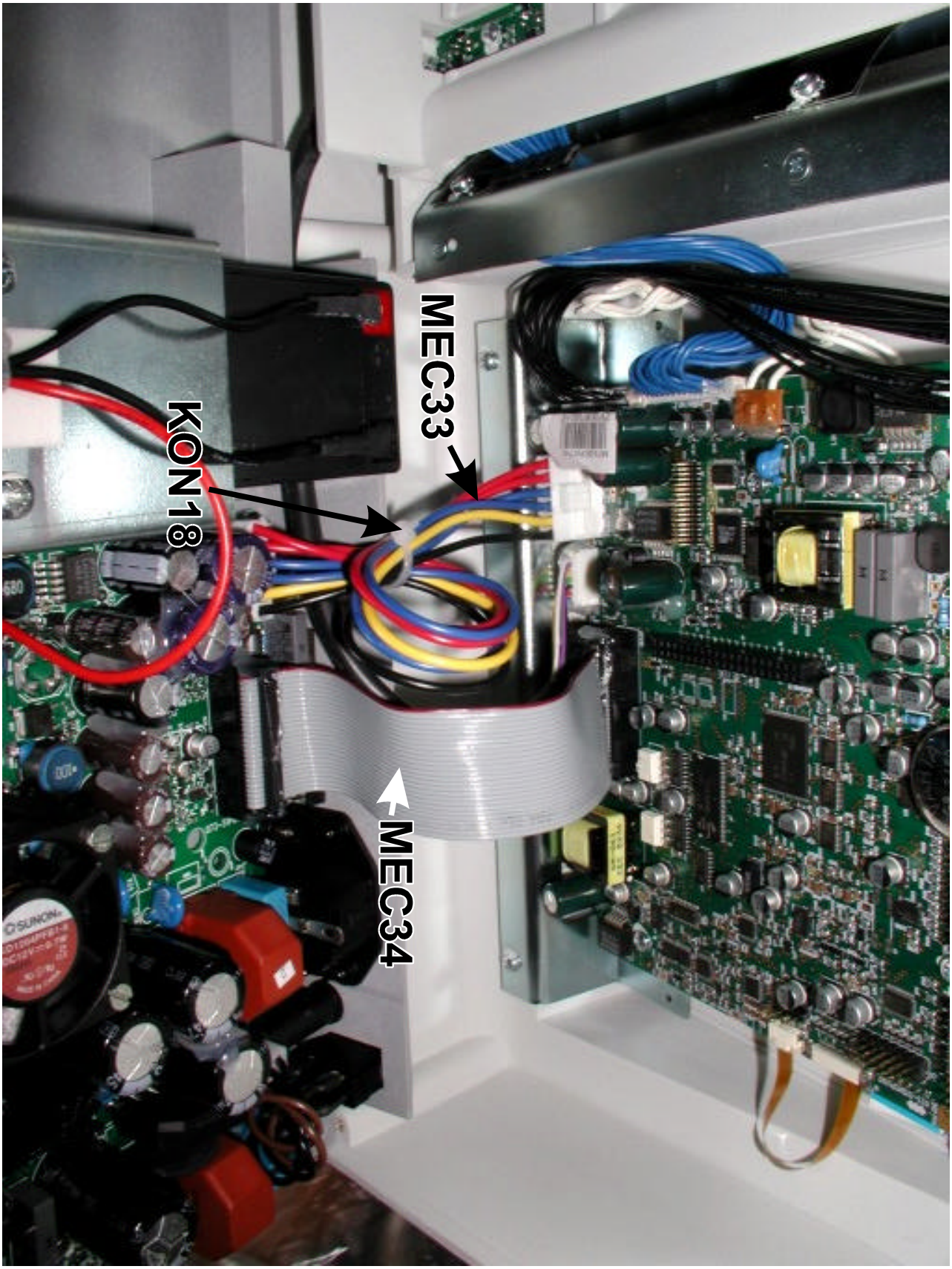

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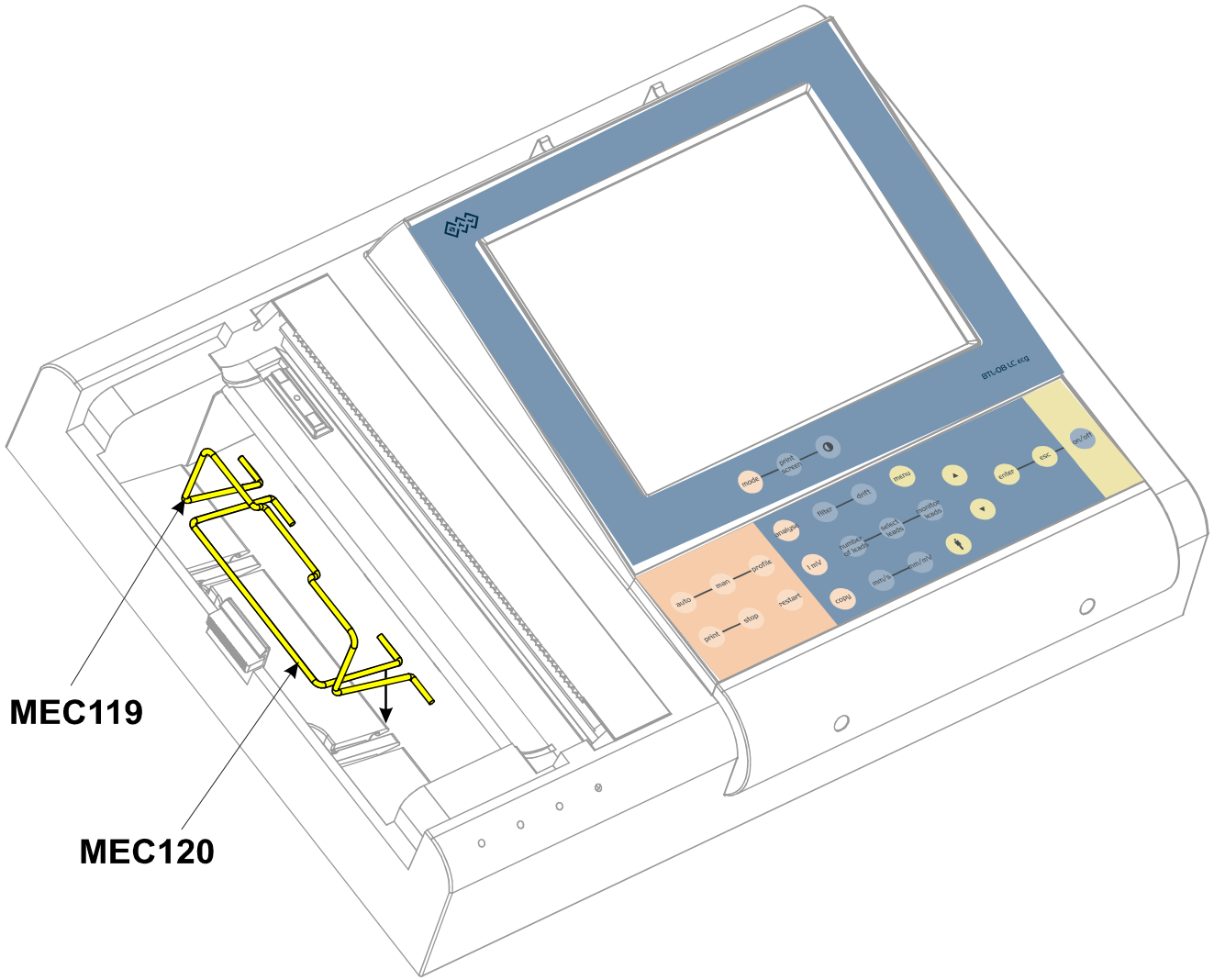

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Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
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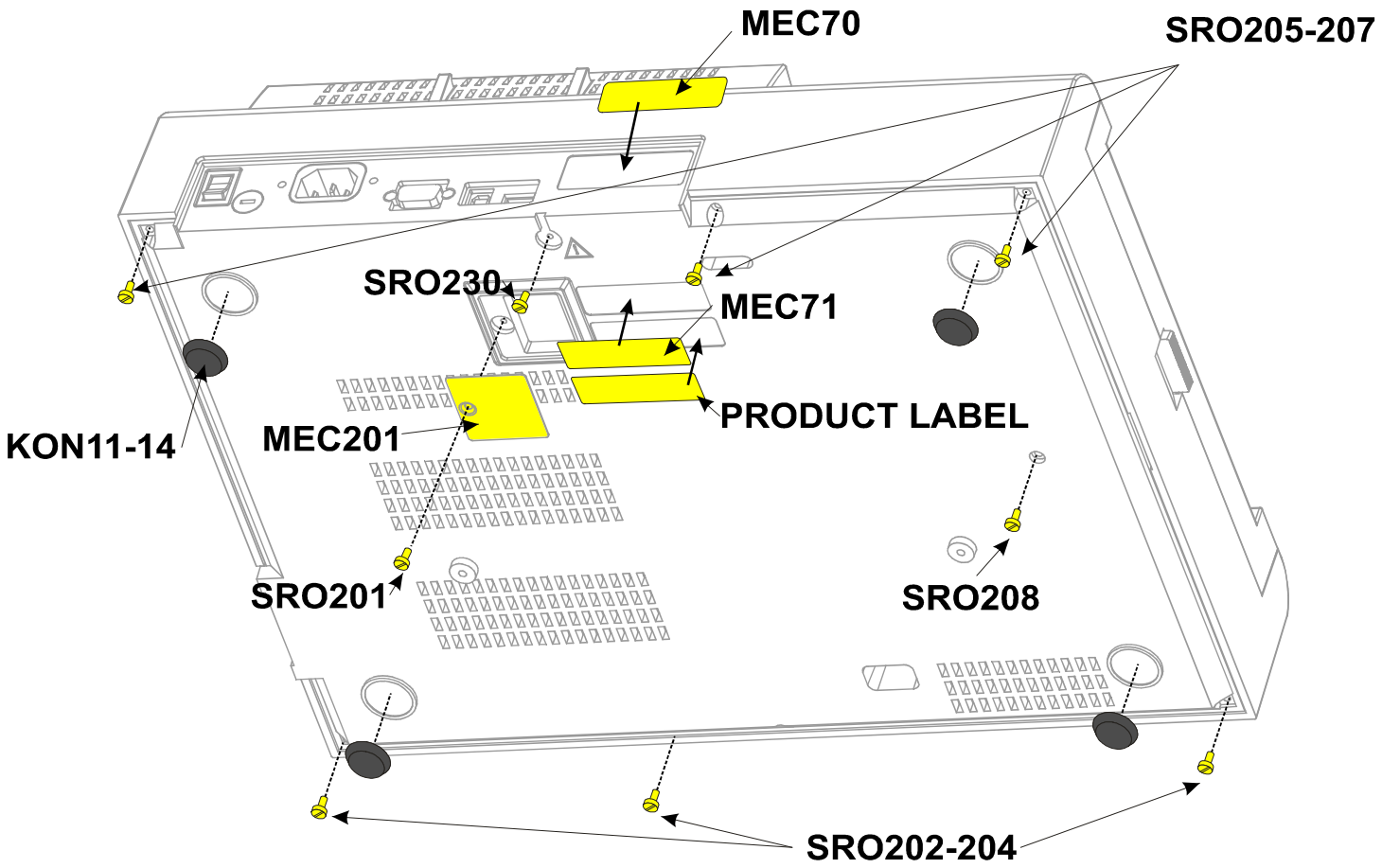

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Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
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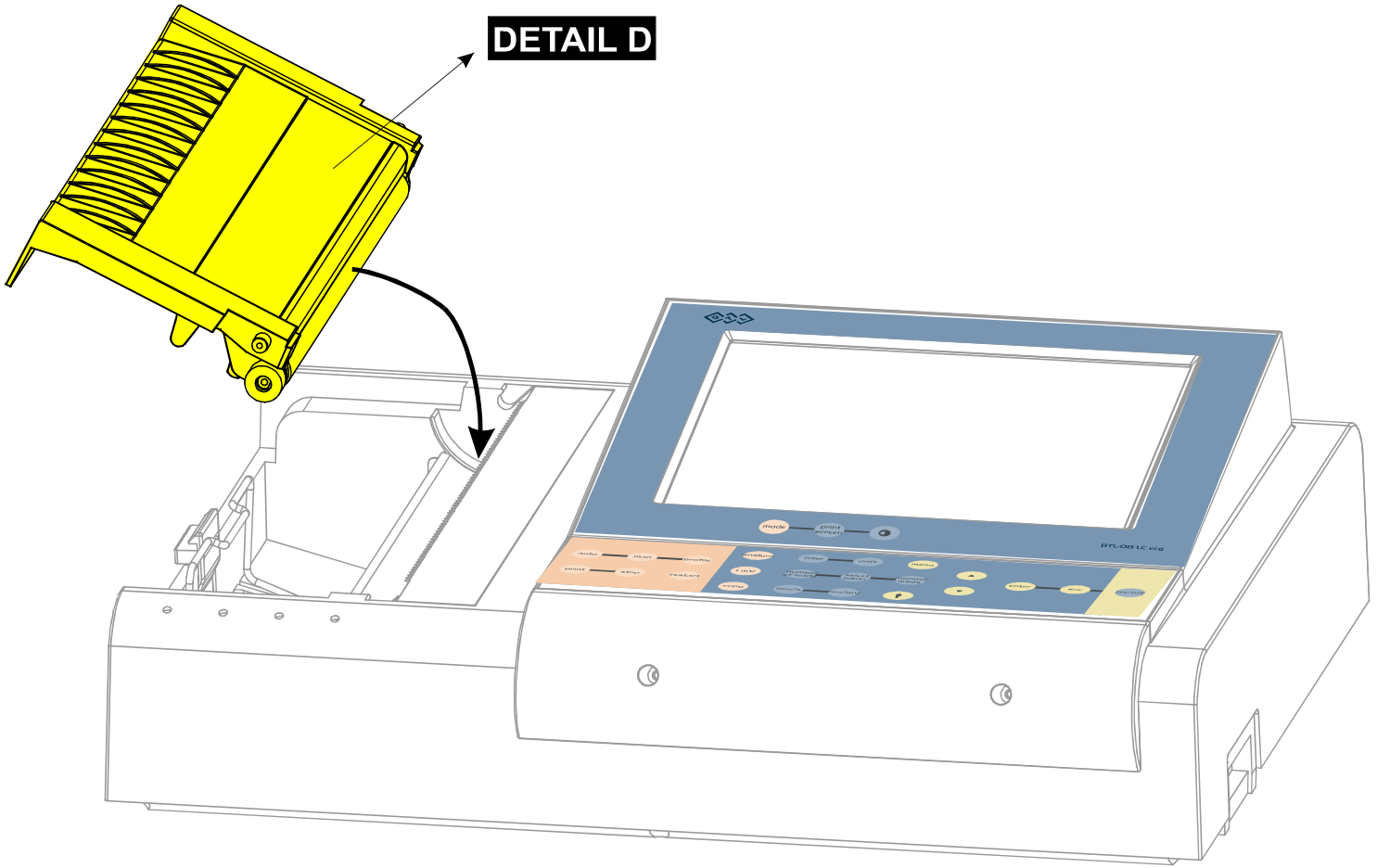

Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
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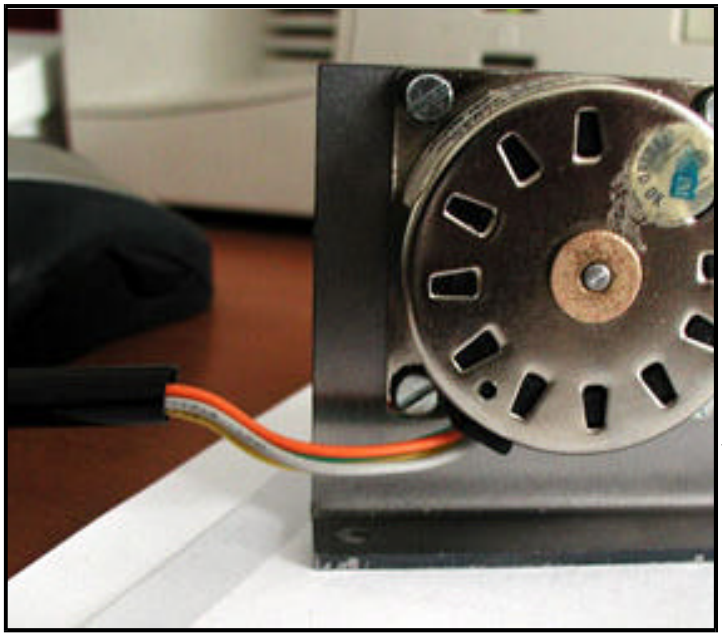
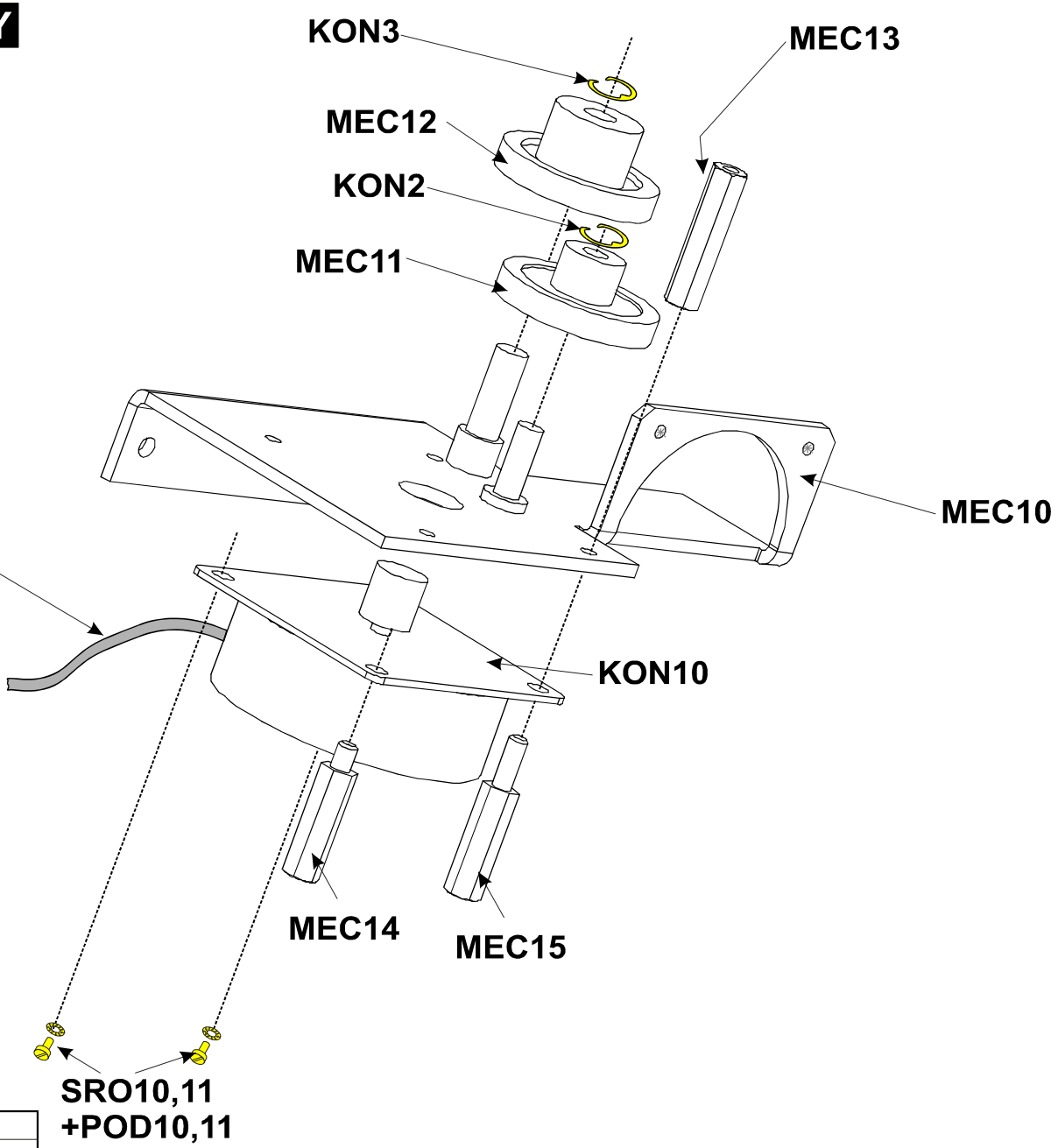
DETAIL A - STEP MOTOR ASSEMBLY





Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
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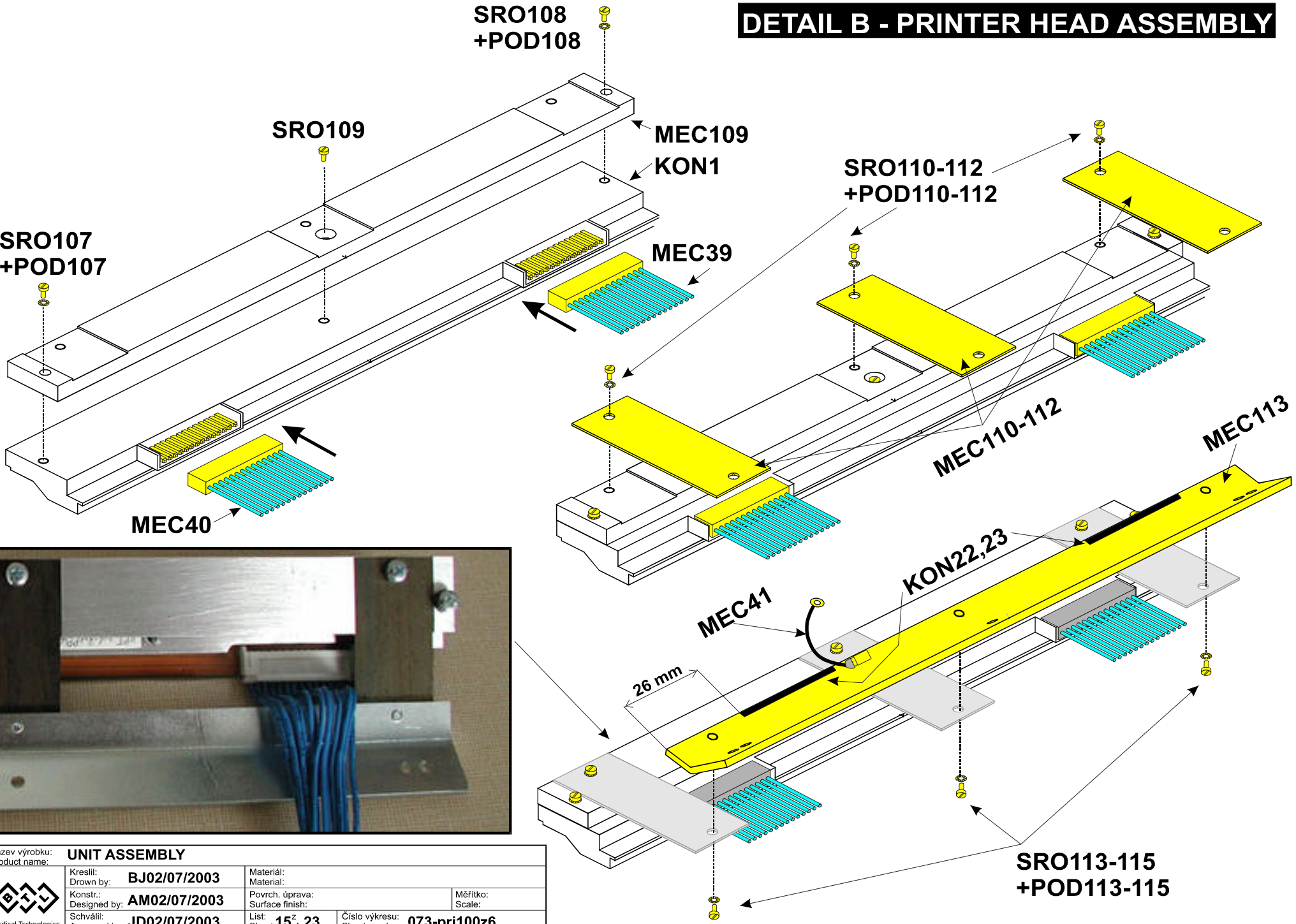
	Schválil: Approved by: **JD02/07/2003**	List: Sheet: **14** z of **23**	Číslo výkresu: Sheet number: **073-pri100z6**	

DETAIL B - PRINTER HEAD ASSEMBLY



Název výrobku: Product name:	**UNIT ASSEMBLY**			
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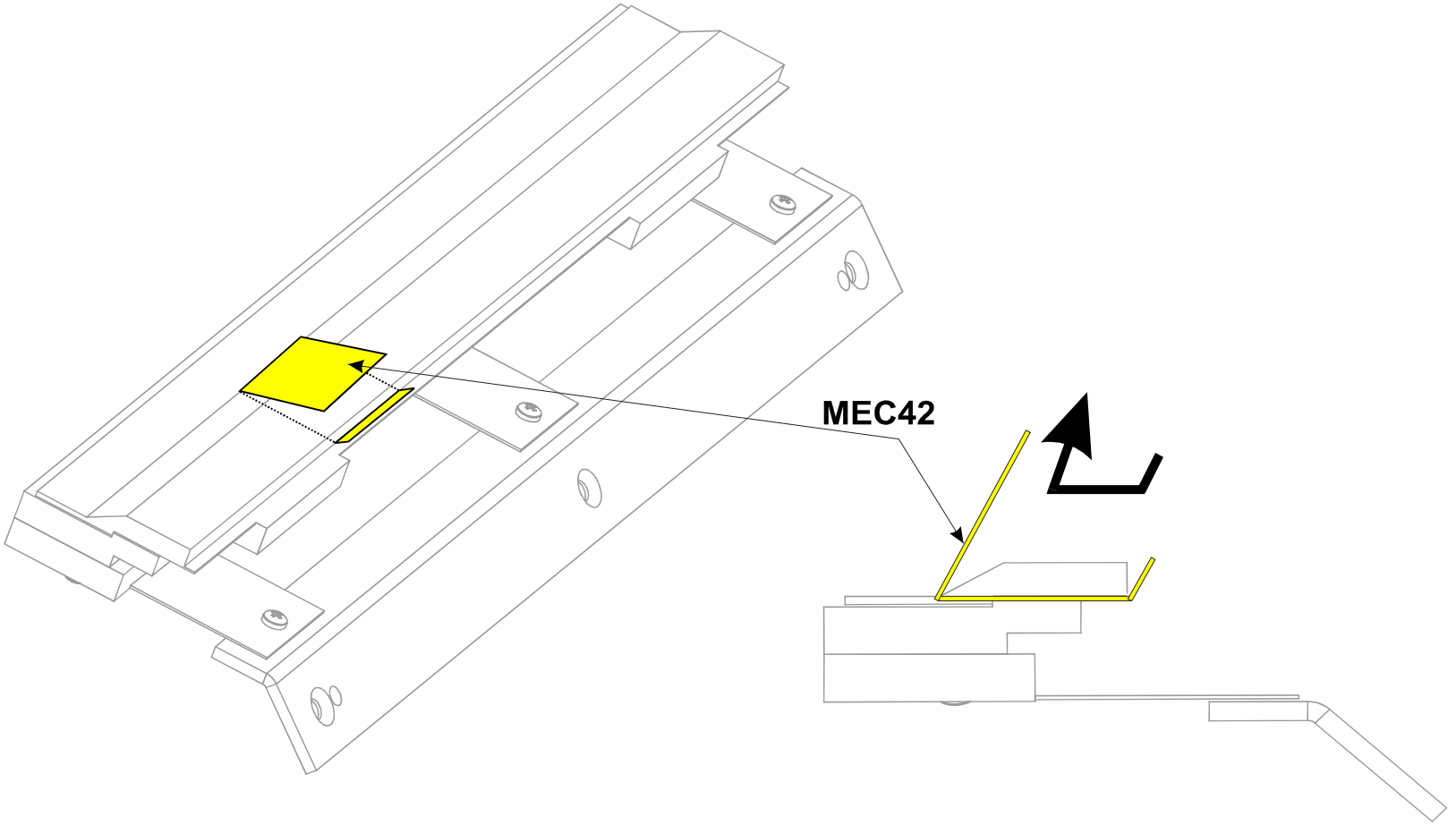
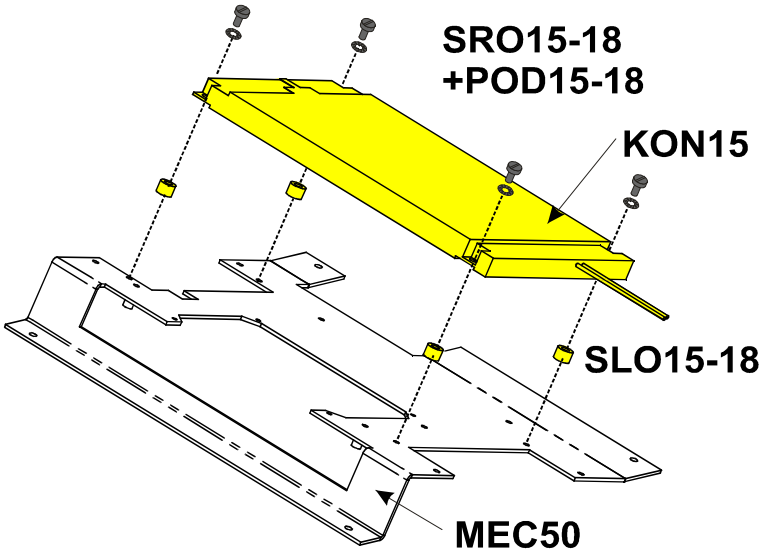
	Konstr.: Designed by: **AM02/07/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD02/07/2003**	List: Sheet: **15** z of **23**	Číslo výkresu: Sheet number: **073-pri100z6**	

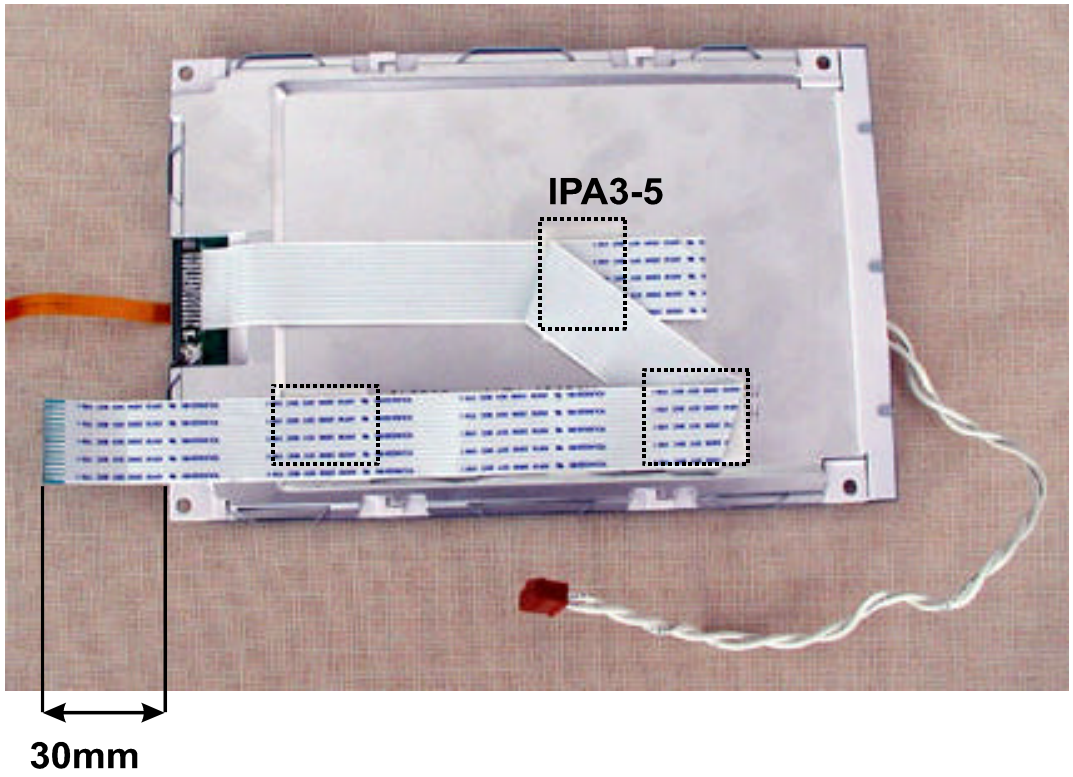


Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
	Konstr.: Designed by: **AM02/07/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD02/07/2003**	List: Sheet: **16** z of **23**	Číslo výkresu: Sheet number: **073-pri100z6**	

DETAIL C - DISPLAY + CPU ASSEMBLY

LT

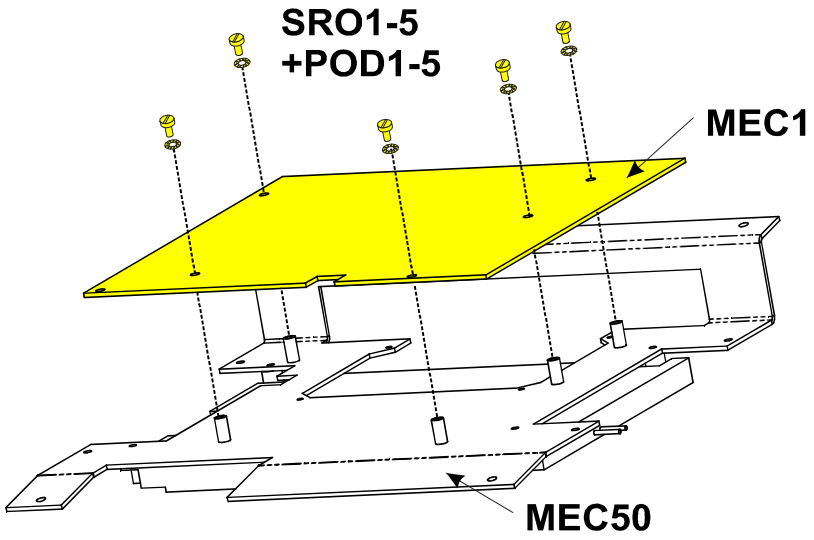


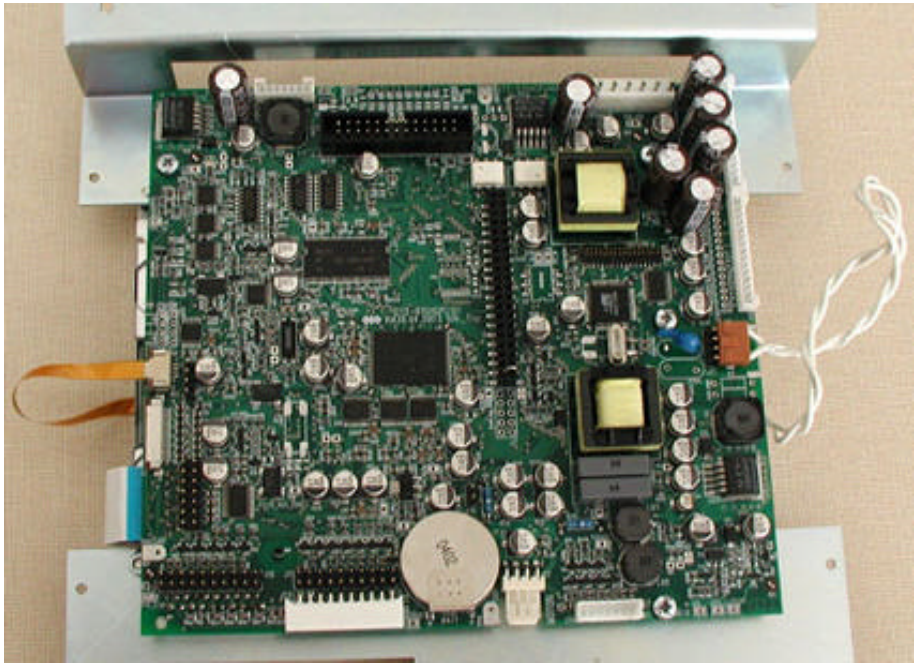


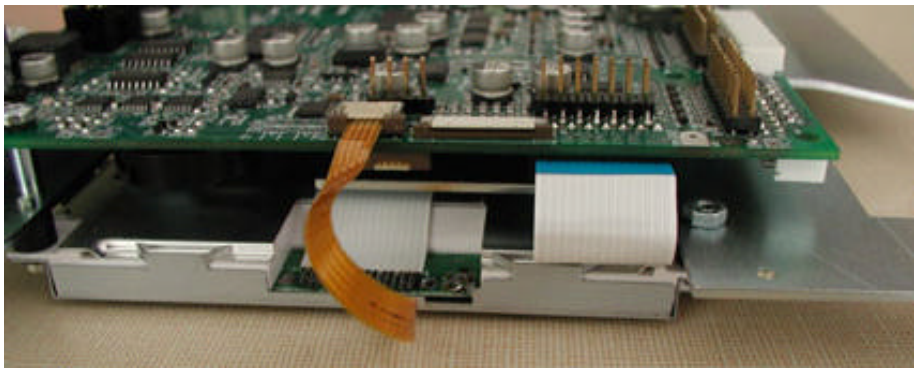
Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
	Konstr.: Designed by: **AM02/07/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD02/07/2003**	List: Sheet: **17**Z of **23**	Číslo výkresu: Sheet number: **073-pri100z6**	

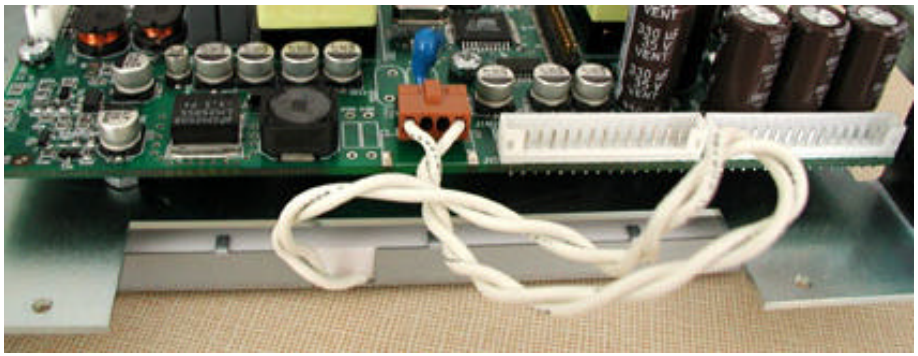
DETAIL C - DISPLAY + CPU ASSEMBLY

LT





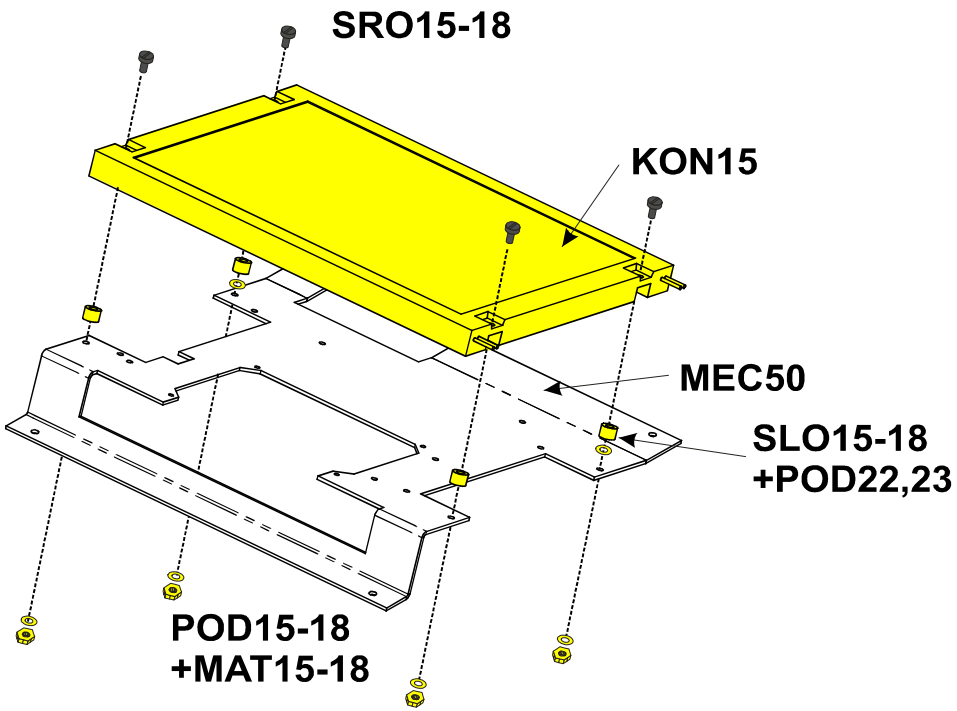


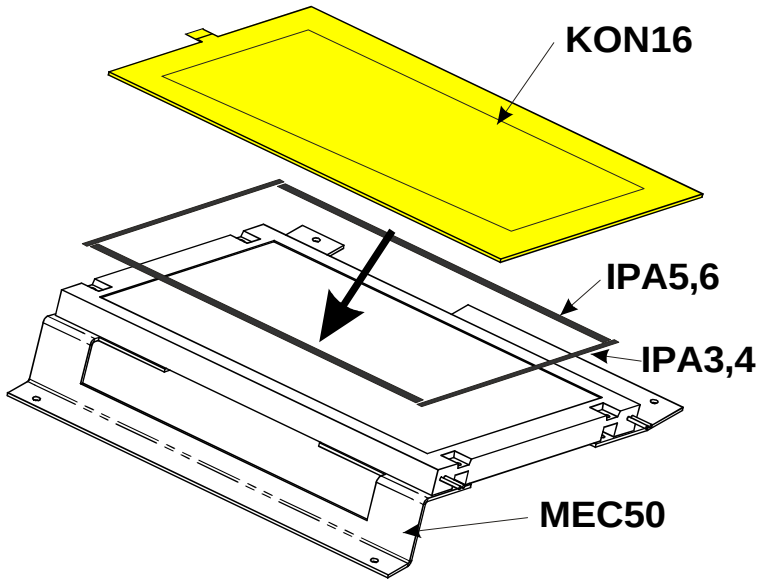


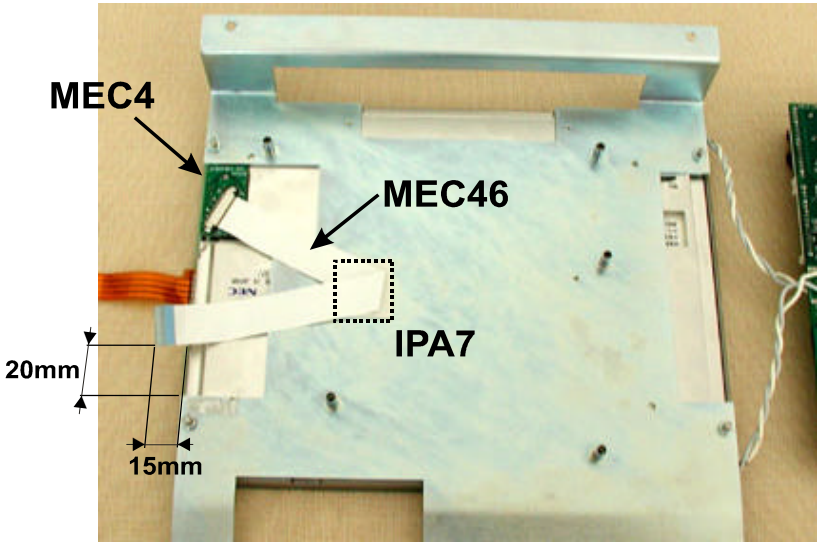
Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
	Konstr.: Designed by: **AM02/07/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD02/07/2003**	List: Sheet: **18** z of **23**	Číslo výkresu: Sheet number:	**073-pri100z6**

DETAIL C - DISPLAY + CPU ASSEMBLY

LC



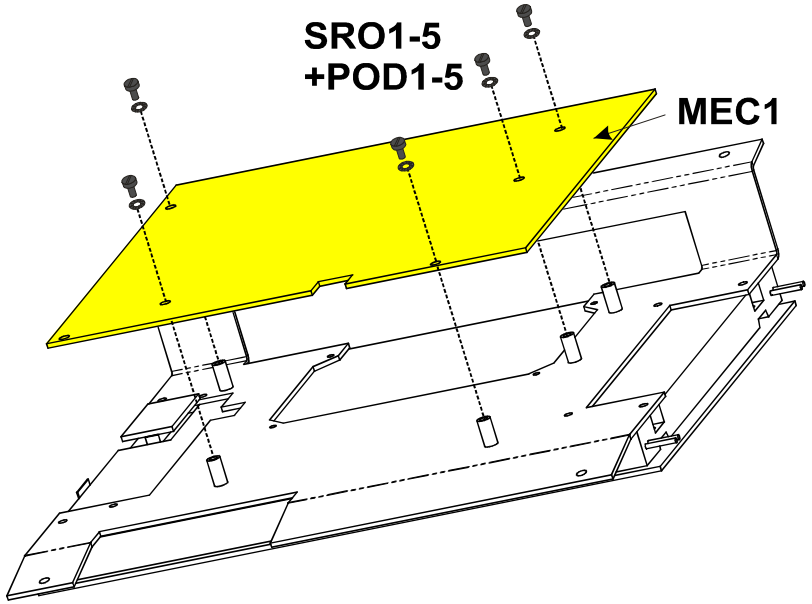


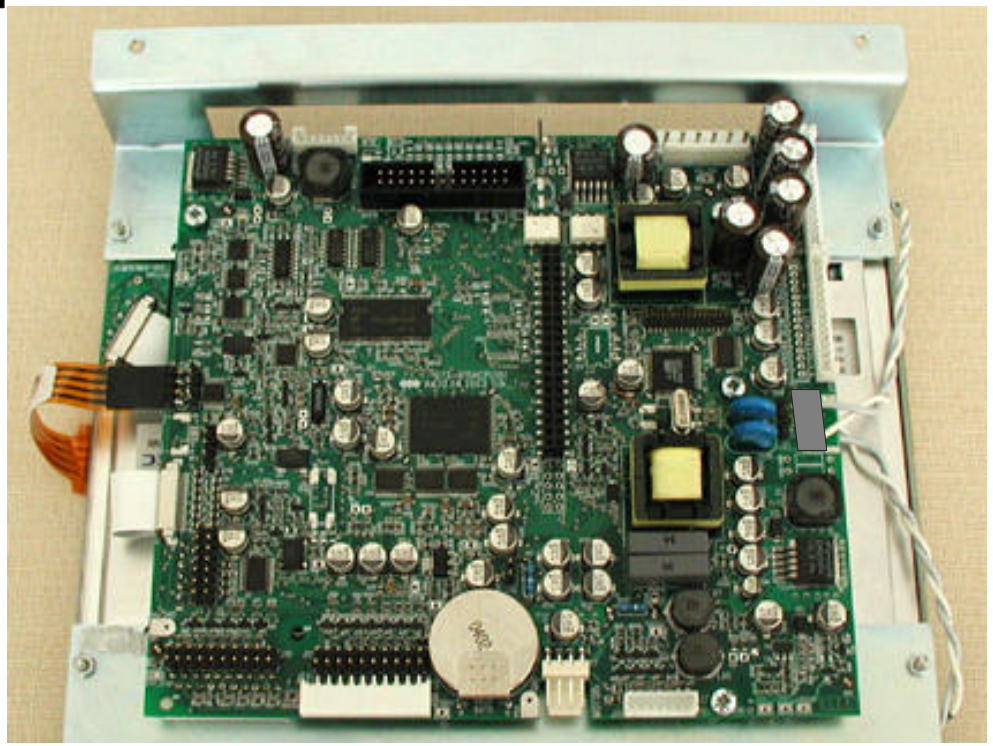


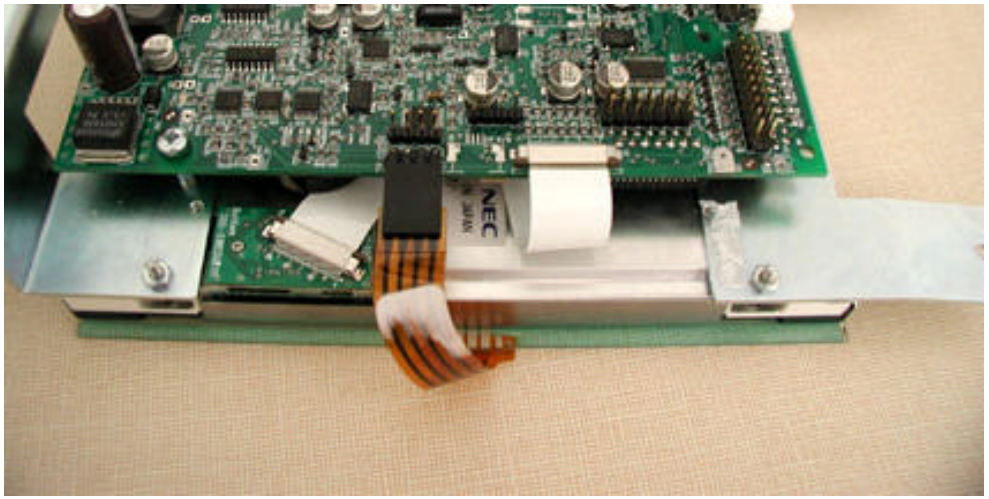
Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
	Konstr.: Designed by: **AM02/07/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD02/07/2003**	List: Sheet: **19** z of **23**	Číslo výkresu: Sheet number: **073-pri100z6**	

DETAIL C - DISPLAY + CPU ASSEMBLY

LC

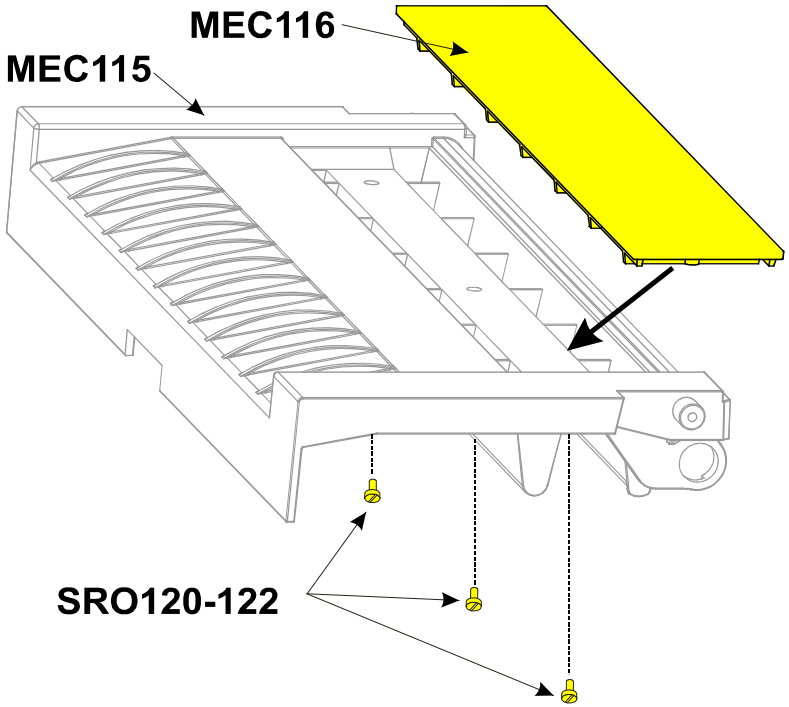


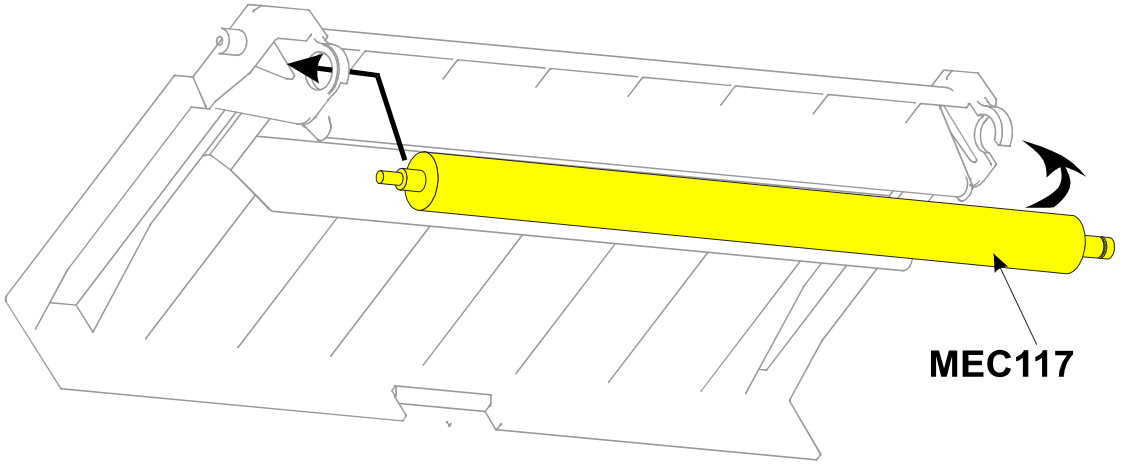


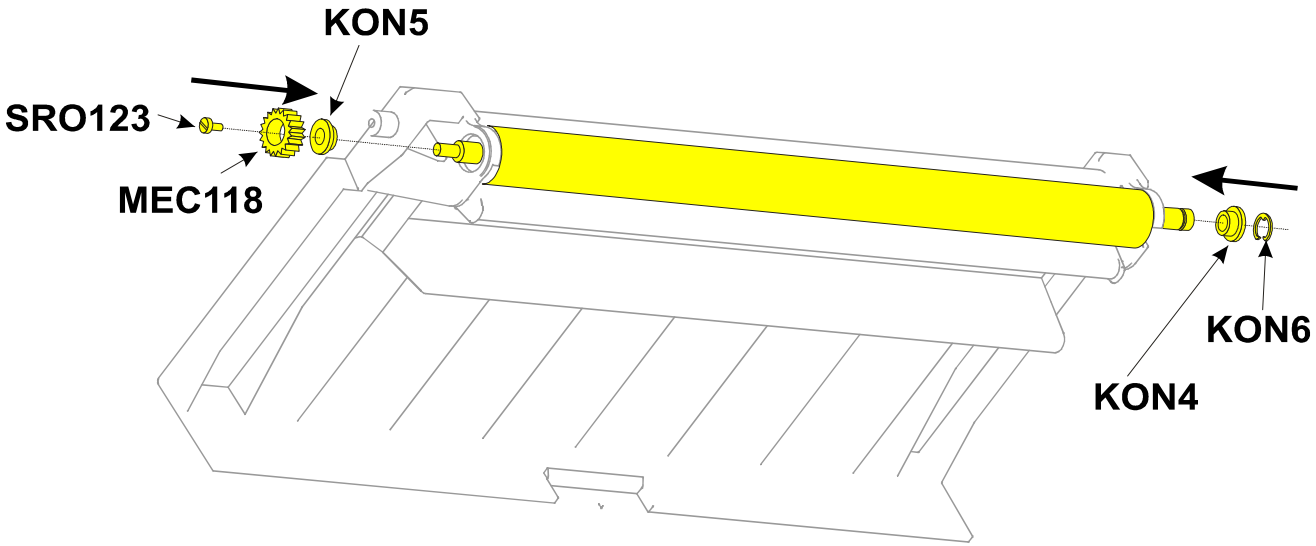


Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
	Konstr.: Designed by: **AM02/07/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD02/07/2003**	List: Sheet: **20** z of **23**	Číslo výkresu: Sheet number: **073-pri100z6**	

DETAIL D - PRINTER ROLLER + COVER ASSEMBLY

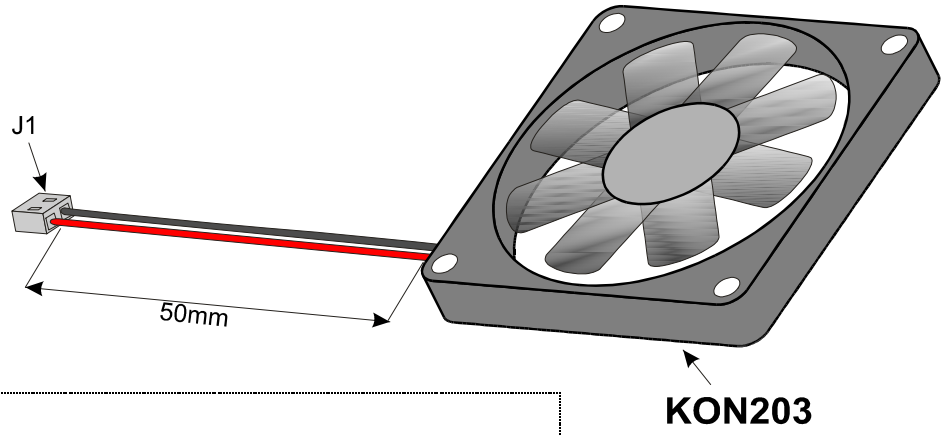


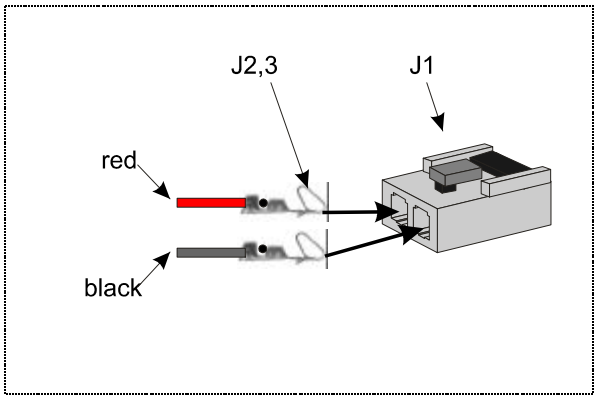




Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
	Konstr.: Designed by: **AM02/07/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD02/07/2003**	List: Sheet: **21** z of **23**	Číslo výkresu: Sheet number: **073-pri100z6**	

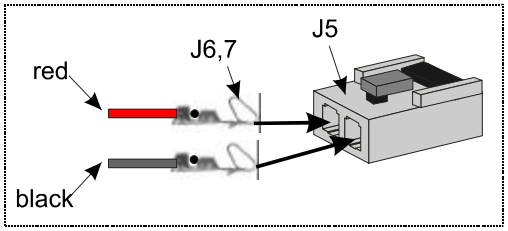
DETAIL E - MODIFICATION OF FAN FOR STEP MOTOR

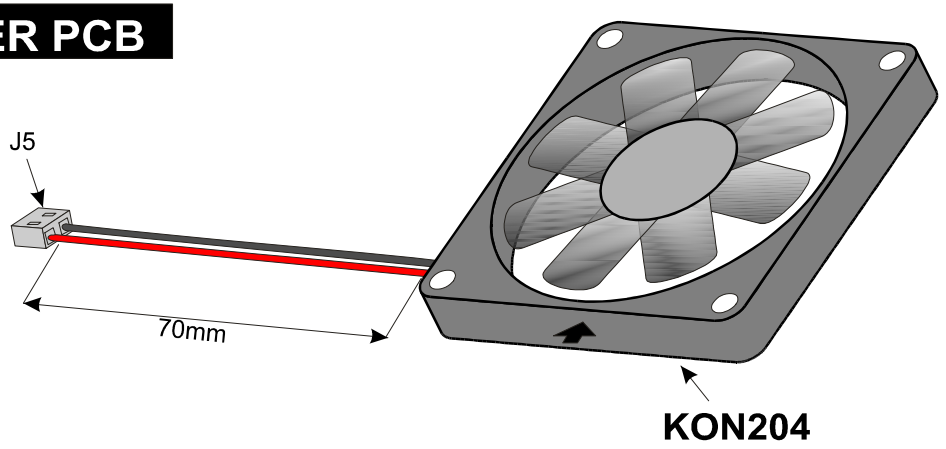


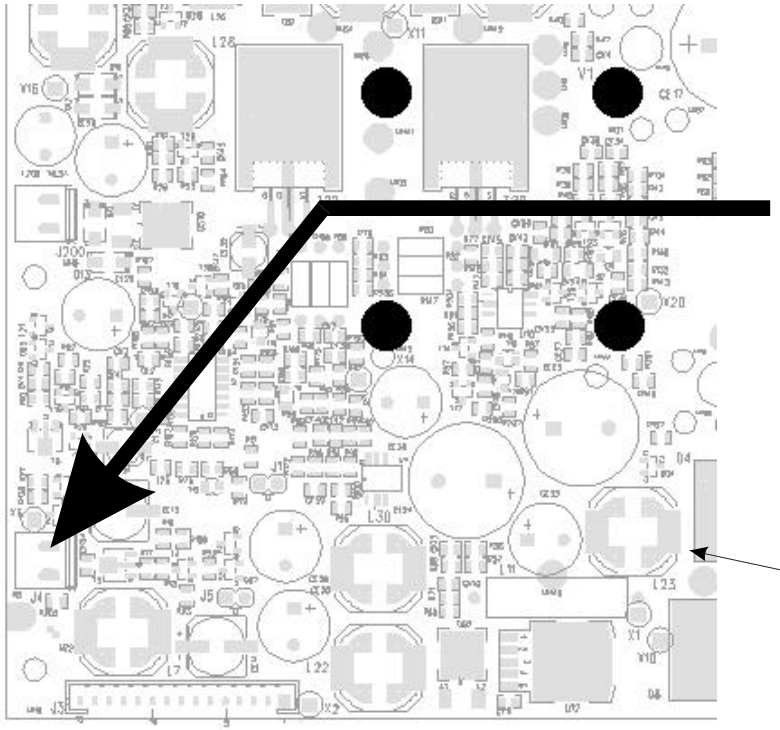


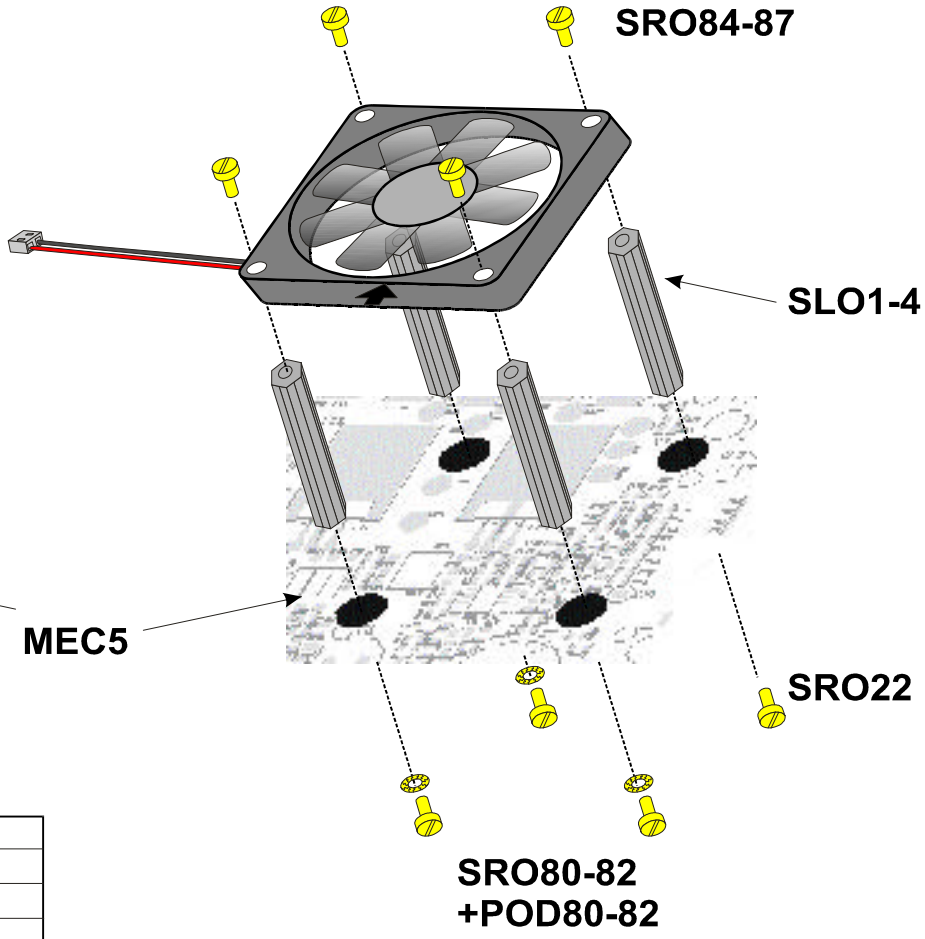
Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
	Konstr.: Designed by: **AM02/07/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD02/07/2003**	List: Sheet: **22** z of **23**	Číslo výkresu: Sheet number: **073-pri100z6**	

DETAIL F - FAN ASSEMBLY AT POWER PCB



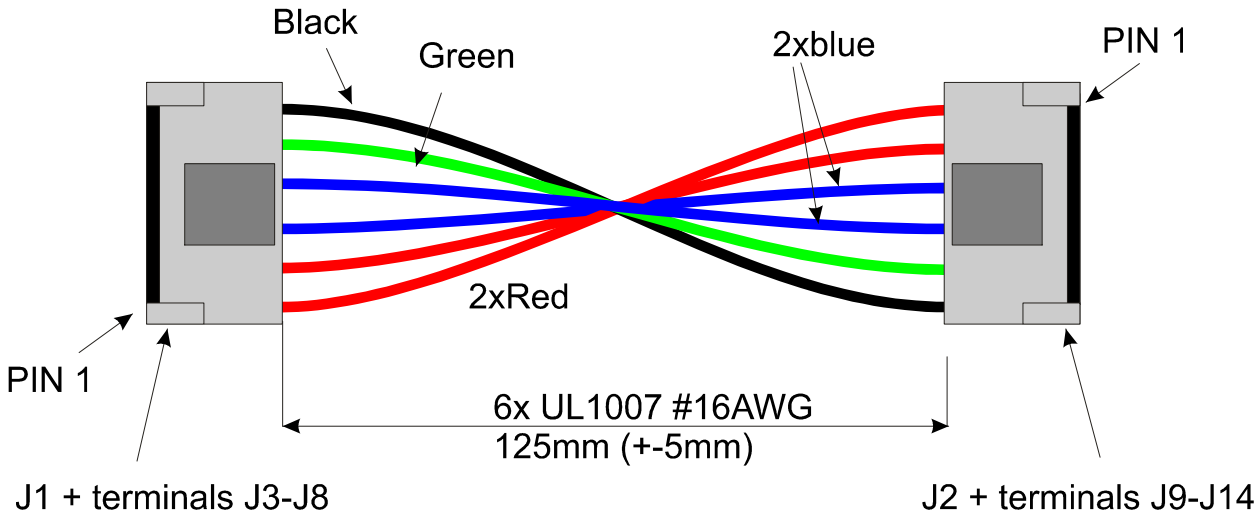






Název výrobku: Product name:	**UNIT ASSEMBLY**			
Medical Technologies	Kreslil: Drown by: **BJ02/07/2003**	Materiál: Material:		
	Konstr.: Designed by: **AM02/07/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD02/07/2003**	List: Sheet: **23** z of **23**	Číslo výkresu: Sheet number: **073-pri100z6**	

073-5501100



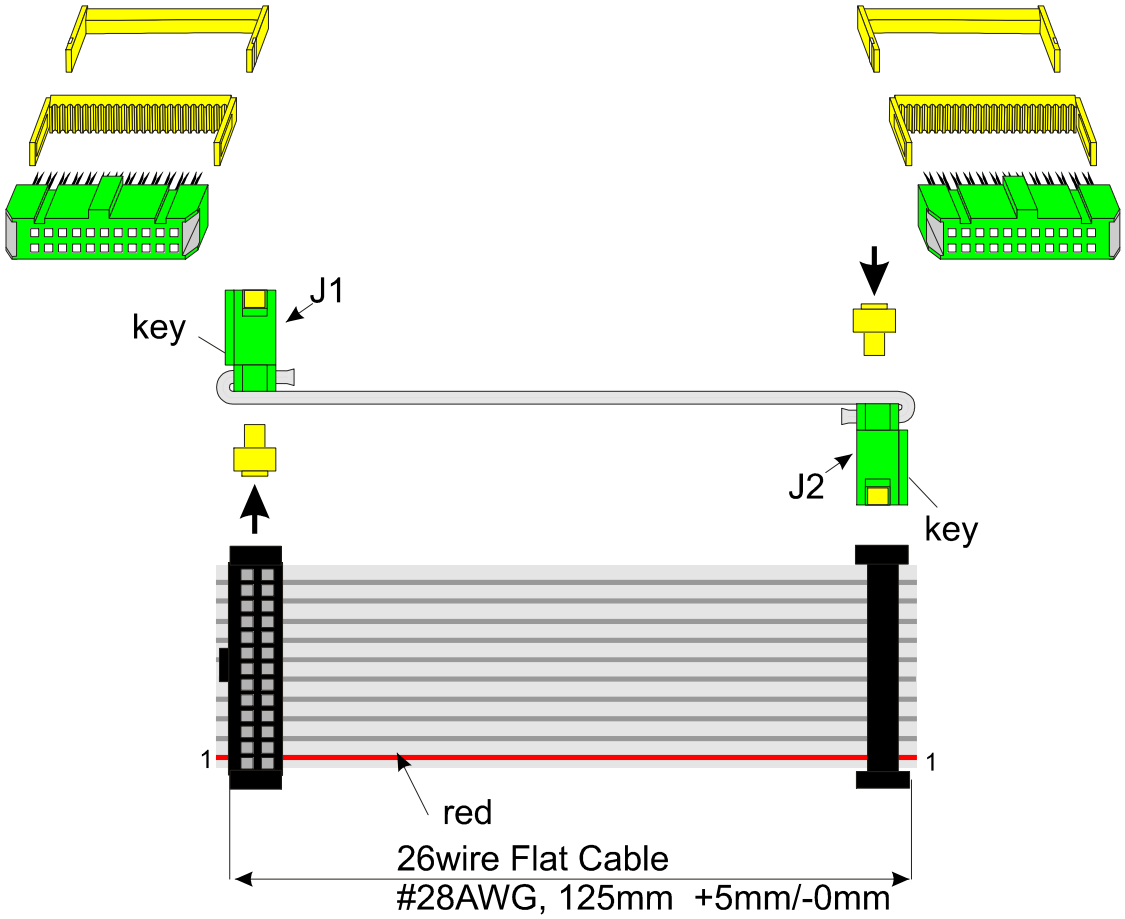
Connectors:

Description	Reference	Molex	JST	AVA
Housing - 3.96mm pitch	J1, J2	35977-0600	VHR-6N	4200-6P
female terminals	J3-J14	35922-9002	SVH-41T-P1.1	4200-T
Mating products		*35978-0610*	*B 6P-VH*	*4100-6PS-T*

Změna: Change No.:	Popis změny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pův. verze: Previous ver.:
V1	**Change of cables length - 5508 and 5509**	**BJ29/07/2003**	**AM29/07/2003**	**JD29/07/2003**	**100**
V2	**cable 5505 added**	**BJ02/01/2004**	**AM02/01/2004**	**JD02/01/2004**	**101**

Název výrobku: Product name:	**supply cable CPU-POWER**			
BTL Medical Technologies	Kreslil: Drown by: **BJ21/05/2003**	Materiál: Material:		
	Konstr.: Designed by: **VCh21/05/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD2105/2003**	List: Sheet: **1** z of **5**	Číslo výkresu: Sheet number:	**073-99kabely102**

073-5503100

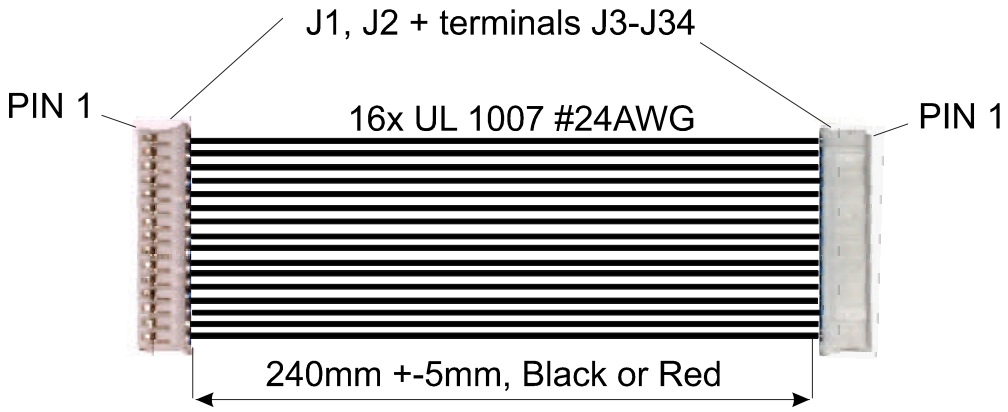


Connectors:

Description	Reference	Molex	JST	AVA
Ribon cable Connectors 2,54mm Pitch	J1, J2	39-51-2263	RA-S261T-(1290)	6700-A-26P-Y-A-B-S1
Mating products		39-26-7265	RK-4261TD	6900-A-10-S-B-T

Název výrobku: Product name:	**CPU - POWER cable**			
Medical Technologies	Kreslil: Drown by: **BJ21/05/2003**	Materiál: Material:		
	Konstr.: Designed by: **VCh21/05/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD2105/2003**	List: Sheet: **2** z of **5**	Číslo výkresu: Sheet number:	**073-99kabely102**

073-5508101

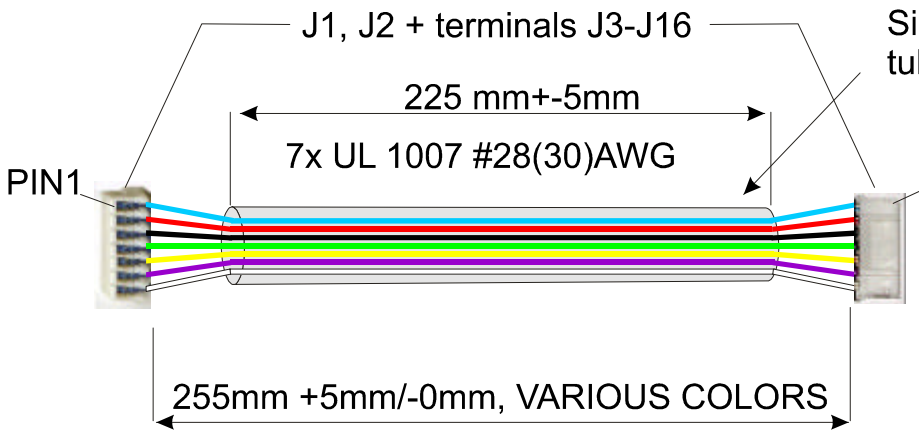


Connectors:

Description	Reference	Molex	JST	AVA
Housing - 2mm pitch female terminals	J1, J2 J3-J34	87369-1600 50212	PHR-16 SPH-002T-P0.5S	5501-16P 5500-T
Mating products		*89400-1610*	*B16B-PH-K-S*	*5401-16PST*

Název výrobku: Product name:	**KYOCERA printer cable 16wires**			
BTL Medical Technologies	Kreslil: Drown by: **BJ21/05/2003**	Materiál: Material:		
	Konstr.: Designed by: **VCh21/05/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD2105/2003**	List: Sheet: **3** z of **5**	Číslo výkresu: Sheet number:	**073-99kabely102**

073-5509101



Color order:

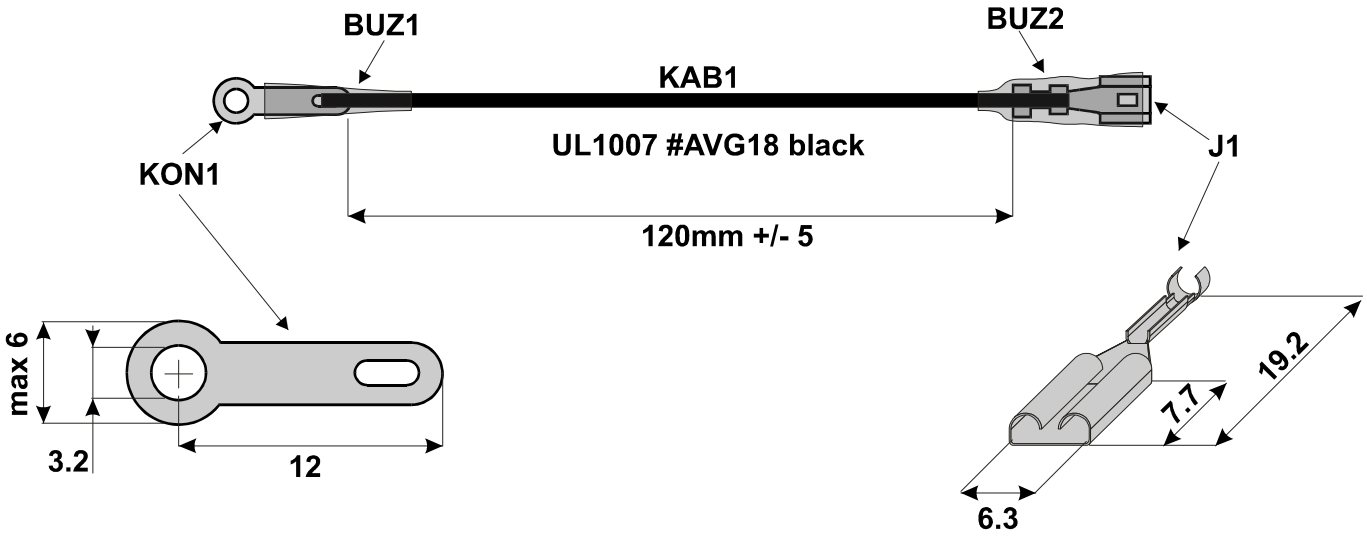
1 - blue
2 - red
3 - black
4 - green
5 - yellow
6 - violet
7 - white

Connectors:

Description	Reference	Molex	JST	AVA
Housing - 2mm pitch female terminals	J1, J2 J3-J16	87369-0700 50212	PHR-7 SPH-002T-P0.5S	5501-7P 5500-T
Mating products		89400-0700	B16B-PH-K-S	5401-7PST

Název výrobku: Product name:	**LED and sensor paper cable**			
BTL Medical Technologies	Kreslil: Drown by: **BJ21/05/2003**	Materiál: Material:		
	Konstr.: Designed by: **VCh21/05/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD2105/2003**	List: Sheet: **4** z of **5**	Číslo výkresu: Sheet number:	**073-99kabely102**

073-5505100



Connectors:

Description	Reference	MOLEX	JST	AVA
Quick Connect Female Receptacle for 6.3x0.8mm Tabs	**J1**	**94512-0201**		
Ring Terminal	**KON1**		SRA-01T-3.2	Ring tongue terminal (d=3.5mm, D=6mm)) with shrinkable tube & 40mm AWG #26 wire

BUZ1+BUZ2 - 2x Shrinkable tubing - black

Název výrobku: Product name:	**Interconnecting cable**			
BTL Medical Technologies	Kreslil: Drown by: **BJ21/05/2003**	Materiál: Material:		
	Konstr.: Designed by: **VCh21/05/2003**	Povrch. úprava: Surface finish:		Měřítko: Scale:
	Schválil: Approved by: **JD2105/2003**	List: Sheet: **5** z of **5**	Číslo výkresu: Sheet number:	**073-99kabely102**

Test protocol

Protocol issued by:.....

Type of unit: ☐ BTL-08 LT ECG ☐ BTL-08 LT DIAG ECG ☐ BTL-08 LC ECG ☐ BTL-08 LC DIAG ECG

Serial number: ☐ 08LTECG- ..... ☐ 08LCECG- .....

Production / Evidence №: ..... **Version of firmware:** .....

Measuring conditions: ambient temperature: .....°C; mains voltage (215 to 240V):.....V
transformer 230V/115V used: ☐

Used equipments:
test device TK01 №:...TK01-E..... HV supply V199-VNZDROJ10x №:...V199-.....
test ECG device V170-ETEST100 №:....V170-E..... Other: .....
.....

1. **Burn-in of device.** Time of burning:..... hr
2. **Check of leakage currents according to OTP-126**
   - 2.1) Leakage current from **functional earthing** (between L+N - PE): less than 450 uA:..... uA
   - 2.2) Leakage current between **mains** and **user + communication parts** of ECG: less than 99 uA: ..... uA
   - 2.3) Leakage current between **communication part (RS232 only)** and **user part**: less than 99 uA:..... uA
   - 2.4) Leakage current between **mains** and **patient** part: less than 9 uA: ..... uA
   - 2.5) Leakage current between **patient part** and **user part**: less than 9 uA: ..... uA
3. **Check of insulation barriers according to OTP-124**
   - 3.1) Insulation barrier **mains** to **functional earthing** (between L+N - PE): (1 800 V; less than 5 uA):..... uA
   - 3.2) Insulation barrier **mains** to **other parts**: (4 800 V; less than 5 uA): ..... uA
   - 3.3) Insulation barrier **communication part (RS232 only)** to **user part**: (1 800 V; less than 5 uA):..... uA
   - 3.4) Insulation barrier **patient part** to **user part + communication part** (3 600 V; less than 5 uA):..... uA
4. **Check of appearance, LCD and keyboard assembly:**..... ☐ YES ☐ NO
5. **The device does not clatter when shaken:** ..... ☐ YES ☐ NO
6. **Check printing and check force for moving of FAX paper on all speeds:**..... ☐ YES ☐ NO
7. **Check paper detection:** ..... ☐ YES ☐ NO
8. **Check printing and check force for moving of PERFORATED paper on all speeds:** ..... ☐ YES ☐ NO
9. **Check page detection on perforated paper:**..... ☐ YES ☐ NO
10. **Check fan function:**..... ☐ YES ☐ NO
11. **Check sound generation:** ..... ☐ YES ☐ NO
12. **Check of mechanical and electrical function of all buttons:** ..... ☐ YES ☐ NO
13. **Check all LED indicators:**..... ☐ YES ☐ NO
14. **Basic setting of device:** (*contrast, language, touch panel, RTC …)* ..... ☐ YES ☐ NO
15. **Set proper battery voltage [mV]:** ..... mV
16. **Set destination dependent parameters:** (*DIAG, mains frequency…)* ..... ☐ YES ☐ NO
17. **Check of data and patients storing:** ..... ☐ YES ☐ NO
18. **Check of hard-reset of unit:** ..... ☐ YES ☐ NO
19. **Type, serial and safety labels are properly sticked-on:** ..... ☐ YES ☐ NO
20. **The fuse box contains the proper fuse:**..... ☐ YES ☐ NO
21. **All points of automatic test PASS:** ..... ☐ YES ☐ NO
22. **Noise of input amplifiers - less than 0.2 mV (it's less than 4 mm for gain 20 mm/mV):**..... mV
23. **Reduction of mains interferential - less than 0.3 mV (it's less than 6 mm for gain 20 mm/mV):**..... mV
24. **Check interference resistant during taking of ECG record:** ..... ☐ YES ☐ NO
25. **Check of communication with PC:** *(FirmwareLoader)* ..... ☐ YES ☐ NO
26. **Clear all test data and make default setting of unit:** *(format file system)* ..... ☐ YES ☐ NO
27. **Check of cleaning of touch-panel, LCD display and unit body:**..... ☐ YES ☐ NO

Date:..... Tested by:.....

28. **Check again of cleaning of touch-panel, LCD display and unit body:**..... ☐ YES ☐ NO
29. **Packaging, completing of accessories:**

Date:..... Packaged by:.....

Final testing and setting of assembled unit (detailed step-by-step procedure)

Step A – point 24
Plug the device in the mains. Enter the upload mode. (To enter the upload mode of the device press simultaneously the AUTO and FILTER buttons while starting the device by the ON/OFF button. The main switch must be in the "0" position. After starting of the upload mode switch the main switch to the "1" position.). Using the "FirmwareLoader" program and the serial cable upload the last version of firmware to the device.
If the correct firmware is already loaded in the device, use the "unit info" function in the "FirmwareLoader" program to check if the device communicates with the program.
Only for factory:
Use the correct version of the modification file for the current hardware configuration (version of PCB of the processor, version of PCB of the power supply, version of PCB of the analog). After uploading enter the correct serial number.
Step B
Switch the device over to the service mode (hold the MENU button pressed when switching the device on by the ON/OFF button. The main switch is in position 1 and the device is connected in the mains). Enter the password for the service mode.
Step C
Only for factory:
Enter "menu-unit setup-service setup". Run function "format all disks" (after formatting the device will be restarted).
Step D

If the device is intended for a country with the mains voltage 115V, connect it via a 230V/115V transformer and perform all tests, except points 2 and 3, with the voltage 115V.

After the restart enter the service mode again. Insert the fax paper in the device. Select "menu-unit setup-service setup-printer test". Check in the paper settings if there is set the fax paper. Run the print test with all speeds in turn. For all speeds the printed triangle must be geometric, fair, smooth, without teeth and/or ripples. The printed grid must be absolutely geometric, without missing and/or compressed lines. The shade of the grid must be the same throughout the entire width of the paper. At the same time check if the paper does not bend to one side and does not crumple. After the test switch the device off.
Step E – point 1
Press the ON/OFF button to switch the device on. (Main switch in the "1" position, the device plugged in the mains). Select another profile than set as default after switch-on (standardly: automat). Leave the device in the on-line mode for at least 12 hours. During the burn-in the device must not restart and it must permanently show the signal on the display (if the device restarts during the operator's absence, there will be set the default mode (standardly manual)).
Step F – point 2
Check the leakage currents and insulation by the MEDITEST 50 device
Note:
Always perform the test without the 230V/115V transformer connected.
Step G – point 3
Check the insulation barriers by the high-voltage device.
Note:
Always perform the test without the 230V/115V transformer connected.
Step H – point 4, 5
Examine the outward appearance of the device, check if it is not scratched or otherwise mechanically damaged. Take the paper out of the device, lift the device up and shake it in all directions for at least 5 seconds. Inside the device nothing shall clatter nor move freely, inside the paper holders, which could loosen. After the test insert the paper again in the device.
Step I – point 6
Enter again the service mode (see step B). Again check the print and the printer (see step D). Check each speed at least 10x successively (so that at least 1m of paper gets out of the device for each speed). At the same time check if the paper does not bend to one side and does not crumple.
Step J – point 7
Check the paper presence detection. After opening the printer door and its lifting off, the yellow indicator "printer" shall light up and a warning message shall appear on the display. After closing the door with paper inserted the pilot light must go out. At the same time check if the printer door freely snaps in and does not tend to open spontaneously (after a light touch on the locking lever).
Step K – point 8, 9

Check guiding and detection of the perforated paper. Enter the print test function: "menu-unit setup-service setup-printer test". Insert perforated paper in the device. In the paper settings select type "perforated" and set/check if the set dimensions correspond to the tested paper. After setting run the "install paper" function, at least 10x. Paper must always run out of the device (1 page) and stop on the perforation. At the same time check if the paper does not bend to one side and does not crumple. Start the print tests on individual speeds, at least 2x for each speed. Do not open the printer cover between individual tests. After completion of all tests the paper must not be crumpled at the sides. (If possible, perform the test always on new paper, not paper which has already passed through the device).

Step L – point 10

Check the function of the ventilator switch-on/switch-off ("menu-unit setup-service setup-ventilator switch-on"). The running ventilator must be heard and must not rattle.

Step M – point 11

Check generation of sound ("menu-unit setup-service setup-sound generation"). After pressing there must sound a short tune.

Step N – point 12

Check the keyboard function ("menu-unit setup-service setup-keyboard test"). The currently pressed key is displayed on the display. it is necessary to check pressing of all keys except on/off.

Step O – point 13

Check function of the indicator LEDs ("menu-unit setup-service setup-LED test"). The indicator LEDs shall light up and go out in turn, except the "power" LED which must shine permanently.

Step P – point 14

Only for factory:

- Calibrate the touch panel ("menu-unit setup-service setup-syst. calibration of touch panel")
- Set the display contrast to 25% (LT type), 50% (LC type) ("menu-unit setup-service setup-system contrast setting")
- Set the system language to "English" ("menu-unit setup-service setup-select sys. language")
- Check and/or set the RTC time and date ("menu-unit setup-service setup-setting sys. (RTC) time")

Step T – point 15

Only for factory:

Calibrate the battery voltage ("menu-unit setup-service setup-battery calibration"). Enter the function. On the bottom of the device unscrew the plastic cover next to the stickers. Measure the voltage of the battery on the test points marked SGND (negative pole) and +AKU (positive pole) by a multimeter. The measured value must not differ from the displayed value by more than 500mV. Convert the exactly measured value to [mV] and enter it in the device. The time between measuring and entering the value should be as short as possible (max 10sec), otherwise it is necessary to repeat measuring. After completion of measuring screw the plastic cover back in place.

Step U – point 16

Only for factory:

- Setting of DIAG upgrade. If the device shall be set with the DIAG upgrade, enter the diagnostics setting function ("menu-unit setup-service setup-unit configuration") and enable/disable DIAG upgrade.
- Setting of the mains frequency. If the country of delivery has the mains frequency 60Hz, it is necessary to set it in the device to 60Hz ("menu-unit setup-user setup-more…-mains frequency").

Step W – point 17

Return to the on-line screen. Enter the "menu-patients" menu. Create and save 3 new patients. Press ON/OFF to switch the device off and after a while switch it on again. Enter the patients menu again and check if the patients remained saved.

Step X – point 18

Check the "hard reset" function. Press the RESTART and ESC buttons simultaneously. The device must immediately restart or switch off.

Step Y – point 21, 22, 23

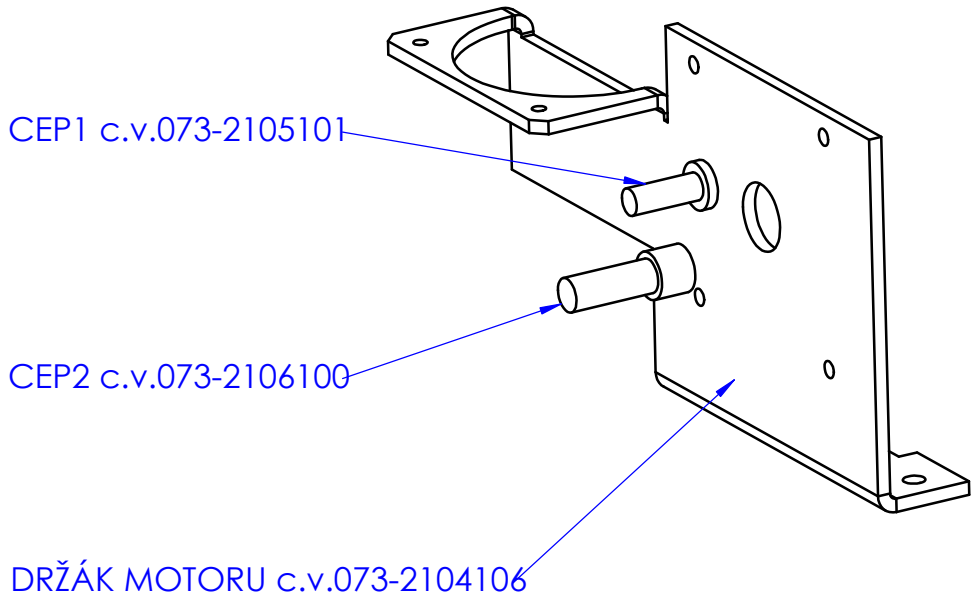
Switch the device on again and enter the service mode (see step B). Run points 21, 22, 23 of tests. In service mode are disabled internal test of disconnected leads. When you are not in service mode you will see dotted lines on paper and not signal. After completion RESTART the unit.

Step Z – point 25

Switch the device on again and enter "menu-unit setup-user setup". DON'T ENTER TO SERVICE MODE. Run function "file system formatting". After completion restart the device (to set the device to the default state).

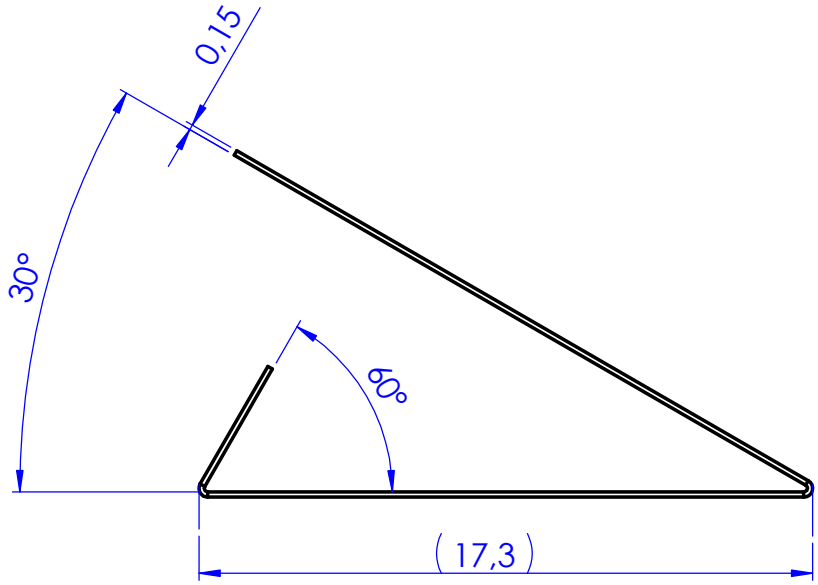
Step AA

Perform all the still uncompleted points of the Test Report.

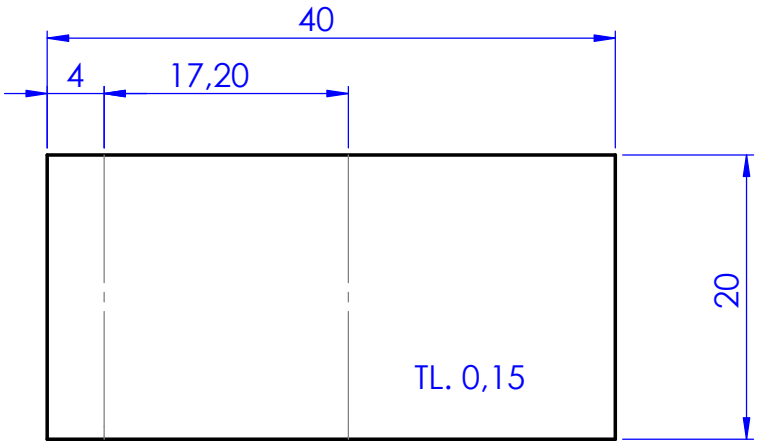


Zmena: Change No.:	Popis zmeny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pred. verze: Prev. ver.:
105	ZMENA DRŽÁKU MOTORU	JM29/10/03	JM29/10/03	TN30/10/03	104
106	ZMENA DRŽÁKU MOTORU	JM02/06/04	JM02/06/04	TN03/06/04	105

Název výrobku: Product name:	**DRŽÁK MOTORU KOMPLET**			
Medical Technologies	Kreslil: Drawn by: **JM18/04/03**	Materiál: **PODSESTAVA**		
	Konstr: Designed by: **JM18/04/03**	Povrch. úprava : Surface finish: **ZINKOVAT**	Merítko: Scale: **1:1**	
	Schválil: Approved by: **TN21/04/03**	List: Sheet: **1** z of **1**	Číslo výkresu: Sheet number: **073-2100106**	



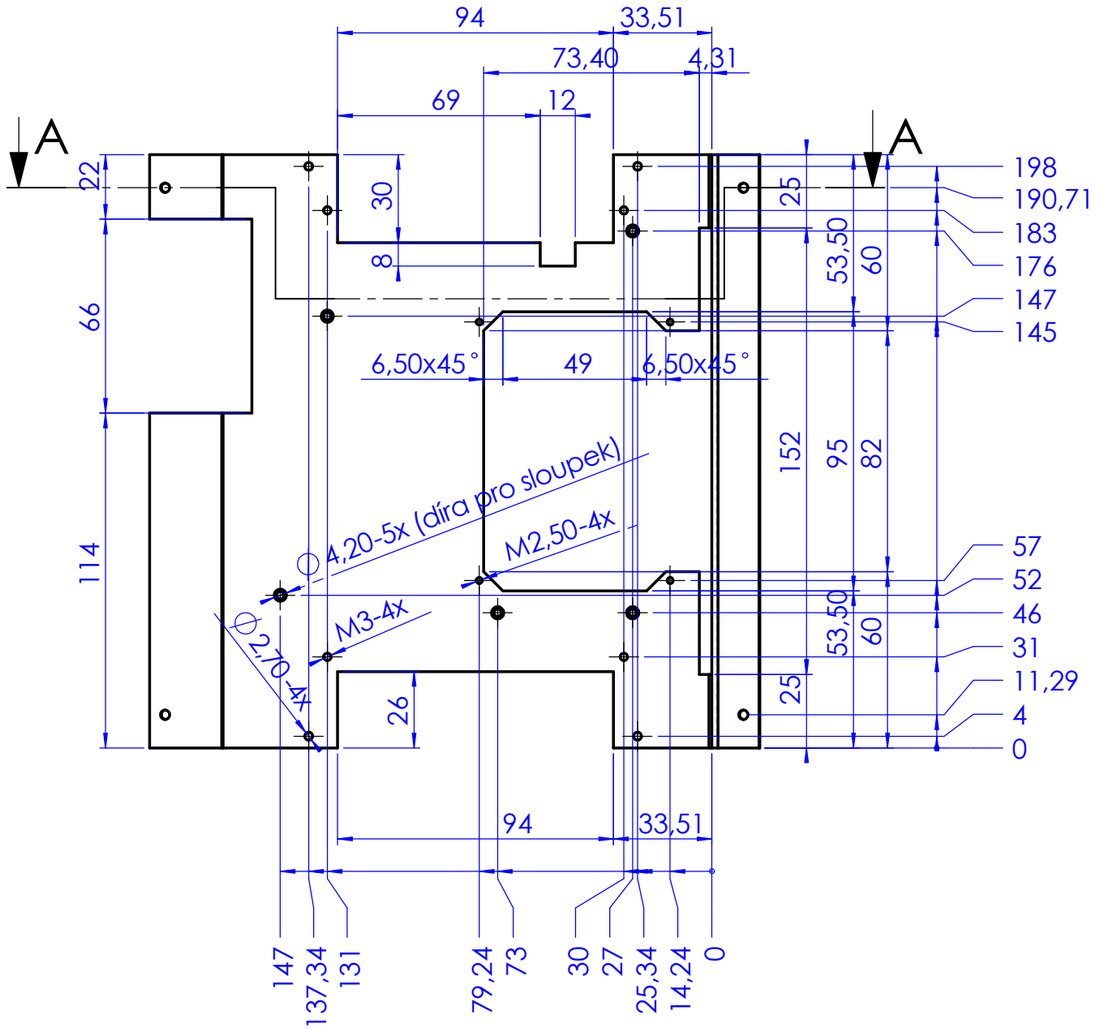
PO OHNUTÍ
M 5:1

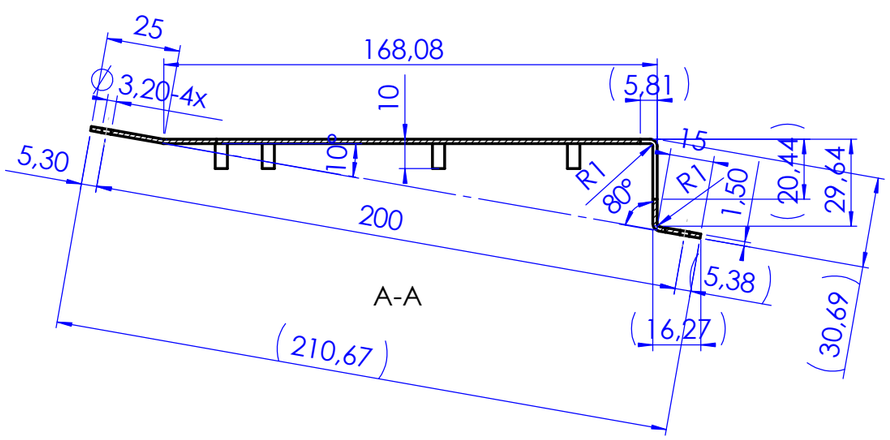


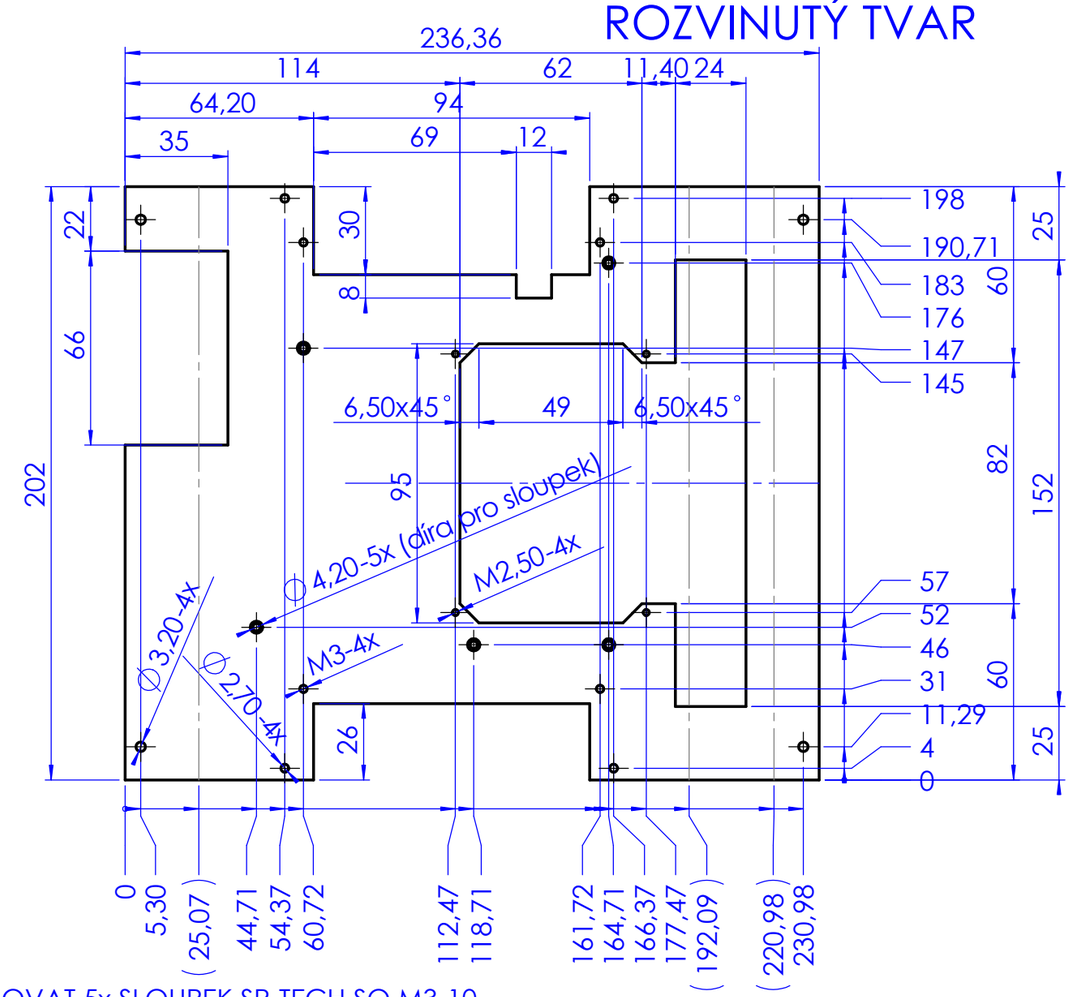
ROZVINUTÝ TVAR
M 2:1

Zmena: Change No.:	Popis zmeny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pred. verze: Prev. ver.:

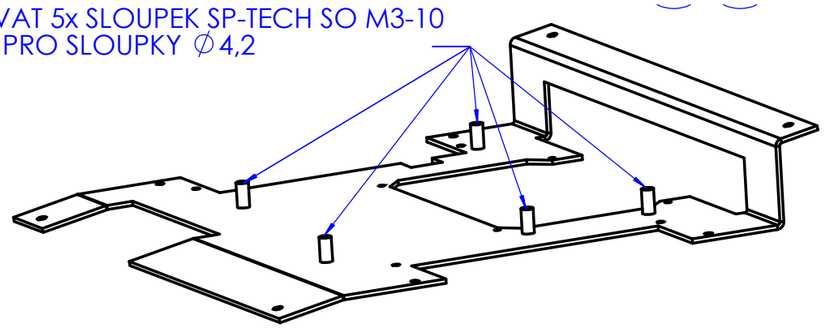
Název výrobku: Product name:	**VODÍTKO PAPÍRU**			
Medical Technologies	Kreslil: Drawn by: **JM08/06/04**	Materiál: **ASTRALON FOLIE TL. 0,13**		
	Konstr: Designed by: **JM08/06/04**	Povrch. úprava : Surface finish: ☒		Merítko: Scale: **5:1(2:1)**
	Schválil: Approved by: **TN09/06/04**	List: Sheet: **1** z of **1**	Číslo výkresu: Sheet number:	**073-2026100**





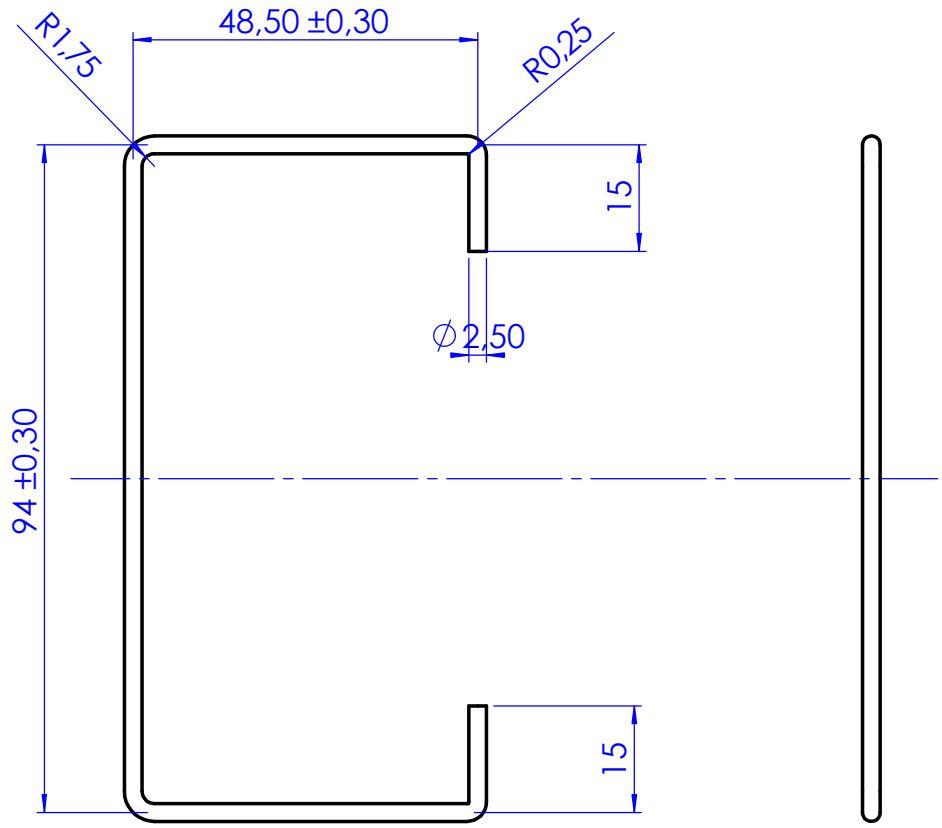


LIŠOVAT 5x SLOUPEK SP-TECH SO M3-10
DÍRY PRO SLOUPKY Ø4,2



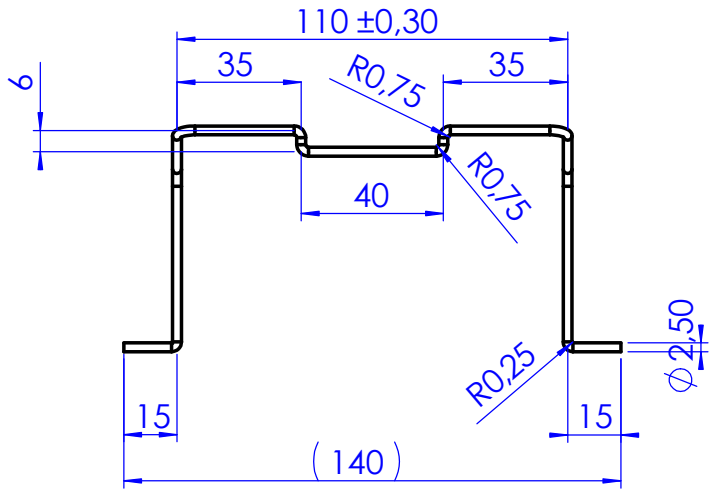
Zmena: Change No.:	Popis zmeny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pred. verze: Prev. ver.:

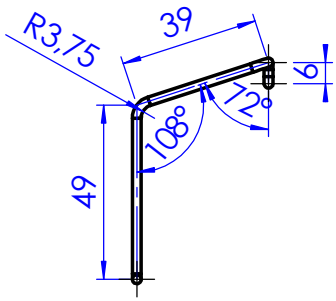
Název výrobku: Product name:	**DRŽÁK DISPLEJU**			
Medical Technologies	Kreslil: Drawn by: **JM25/02/03**	Materiál: **11 321.21**		
	Konstr: Designed by: **JM25/02/03**	Povrch. úprava : Surface finish: **ZINKOVAT**	Merítko: Scale: **1:1**	
	Schválil: Approved by: **TN26/02/03**	List: Sheet: **1** z of **1**	Císlo výkresu: Sheet number: **073-2024101**	

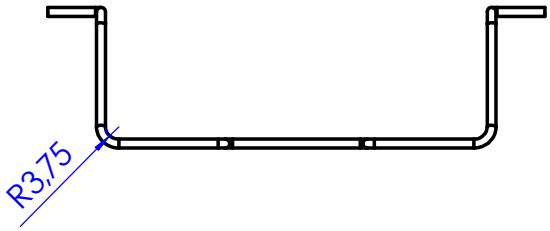


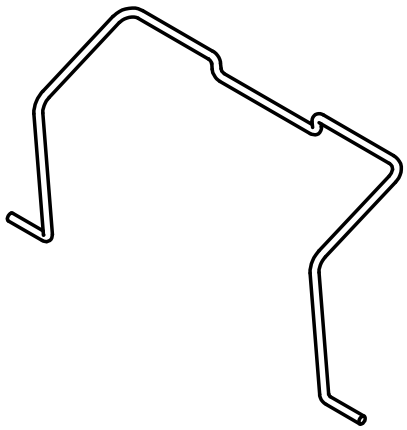
Zmena: Change No.:	Popis zmeny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pred. verze: Prev. ver.:

Název výrobku: Product name:	**ZARÁŽKA ROLICKY**			
Medical Technologies	Kreslil: Drawn by: **JM26/02/03**	Materiál: **OCEL DRÁT**		
	Konstr: Designed by: **JM26/02/03**	Povrch. úprava : Surface finish: **ZINKOVAT**		Merítko: Scale: **1:1**
	Schválil: Approved by: **TN27/02/03**	List: Sheet: **1** z of **1**	Číslo výkresu: Sheet number:	**073-2023100**





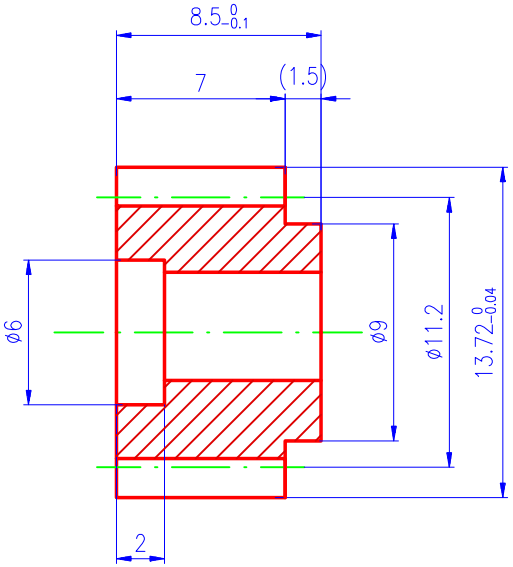


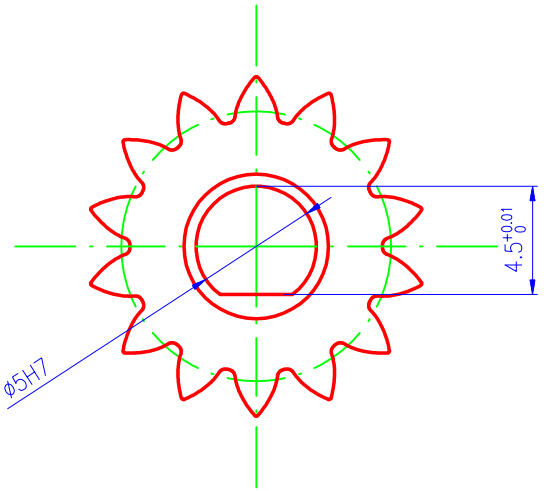


Zmena: Change No.:	Popis zmeny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pred. verze: Prev. ver.:

Název výrobku: Product name:	**VYHAZOVAC PAPÍRU**			
Medical Technologies	Kreslil: Drawn by: **JM26/02/03**	Materiál: **OCEL DRÁT**		
	Konstr: Designed by: **JM26/02/03**	Povrch. úprava : Surface finish: **ZINKOVAT**		Merítko: Scale: **1:1**
	Schválil: Approved by: **TN27/02/03**	List: Sheet: **1** z of **1**	Číslo výkresu: Sheet number:	**073-2022100**

Modul			m	0.8
Počet zubů			z	14
Normálný základní profil			–	CSN 01 4607
Úhel sklonu boční křivky zubu			beta	
Smysl stoup. boční křivky zubu			–	
Jednotkové posunutí			x	0.8000
Stupeň přesnosti podle			–	
Kontrolované mezní úchylky	dvoubokého odvalu za otáčku		F''i	
	dvoubokého odvalu za rozteč		f''i	
	sklonu zubu		Fb	
	vzdálenosti os		fa	
Kontrolní rozměr	mezní úchylka jm. vzdál. os	horní	Ea''s	
		dolní	Ea''i	
	přes válečky		–	
Spoluzabírající kolo	číslo výkresu		–	073–2002100
	počet zubů		z	14
	vzdálenost os		aw	12.3±0.05
Modul			mt	
Počet zubů hřebenu, segmentu			z	
Průměr základní kružnice			db	10.5246
Průměr roztečné kružnice			d	11.2
Průměr patní kružnice			df	10.48
Úhel sklonu boční křivky zubu na základním válci			betat	
Úhel os			Σ	0

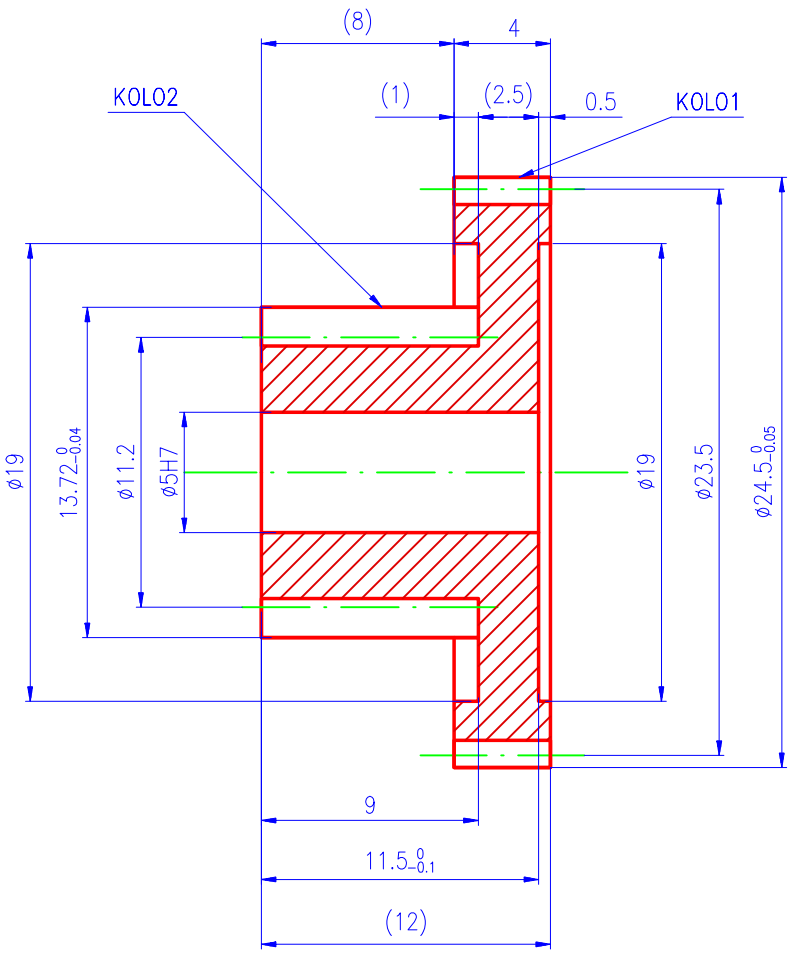


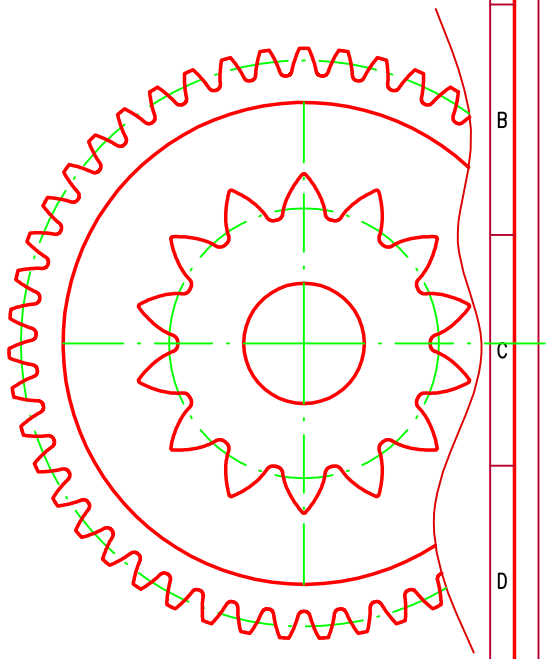


U PASTORKU JSOU VLIVEM KOREKCE ŠPIČATÉ ZUBY – VIZ. POHLED !!!

Název výrobku: Product name: PASTOREK			
Medical Technologies	Kreslil: Drawn by: JMO6/12/02	Materiál: POLYACETAL (POM)	
	Konstr: Designed by: JMO6/12/02	Povrch. úprava : Surface finish:	Měřítko: Scale: 5:1
	Schválil: Approved by: TDO9/12/02	List: 1 z of 1	Číslo výkresu: Sheet number: 073–2003100

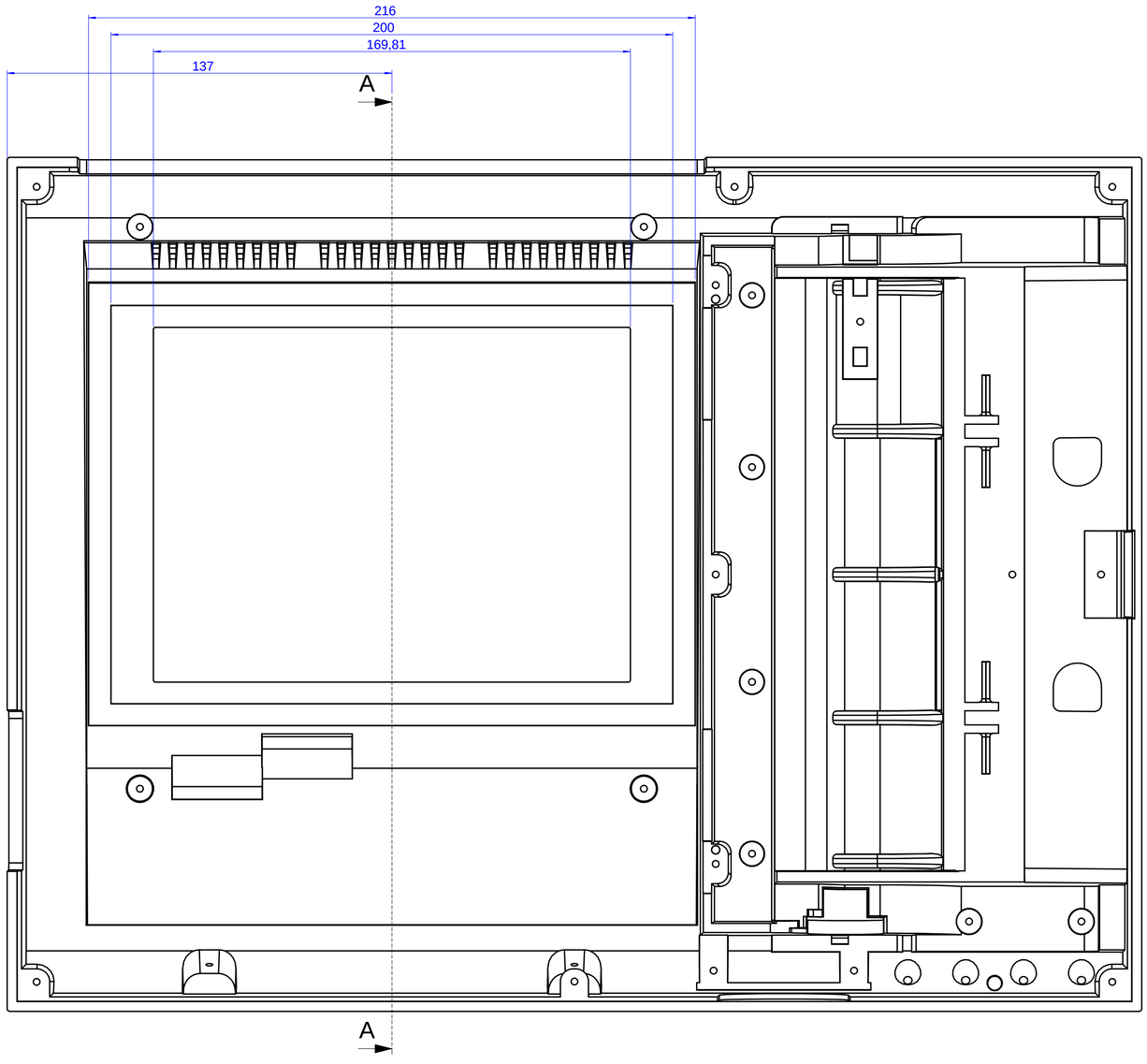
Modul			m	0.5	0.8
Počet zubů			z	47	14
Normálný základní profil			–	CSN 01 4607	CSN 01 4607
Úhel sklonu boční křivky zubu			beta		
Smysl stoup. boční křivky zubu			–		
Jednotkové posunutí			x	-	0.8000
Stupeň přesnosti podle			–		
Kontrolované mezní úchylky	dvoubokého odvalu za otáčku		F''i		
	dvoubokého odvalu za rozteč		f''i		
	sklonu zubu		Fb		
	vzdálenosti os		fa		
Kontrolní rozměr	mezní úchylka jm. vzdál. os	horní	Ea''s		
		dolní	Ea''i		
	přes válečky		–		
Spoluzabírající kolo	číslo výkresu		–	073–2001100	073–2003100
	počet zubů		z	17	14
	vzdálenost os		aw	16±0.05	12.3±0.05
Modul			mt		
Počet zubů hřebenu, segmentu			z		
Průměr základní kružnice			db	22.0828	10.5246
Průměr roztečné kružnice			d	23.5	11.2
Průměr patní kružnice			df	22.25	10.48
Úhel sklonu boční křivky zubu na základním válci			betat		
Úhel os			Σ	0	0
				KOLO1	KOLO2

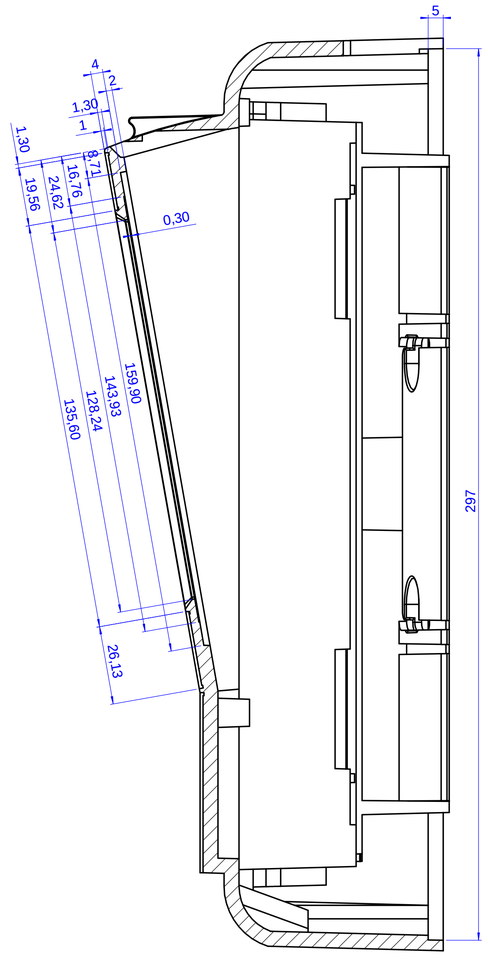




U KOLA2 JSOU VLIVEM KOREKCE ŠPIČATÉ ZUBY – VIZ. POHLED !!!

Název výrobku: Product name: DVOJKOLO 2			
Medical Technologies	Kreslil: Drawn by: JMO6/12/02	Materiál: POLYACETAL (POM)	
	Konstr: Designed by: JMO6/12/02	Povrch. úprava : Surface finish:	Měřítko: Scale: 5:1
	Schválil: Approved by: TDO9/12/02	List: 1 Sheet: z of 1	Číslo výkresu: Sheet number: 073–2002100

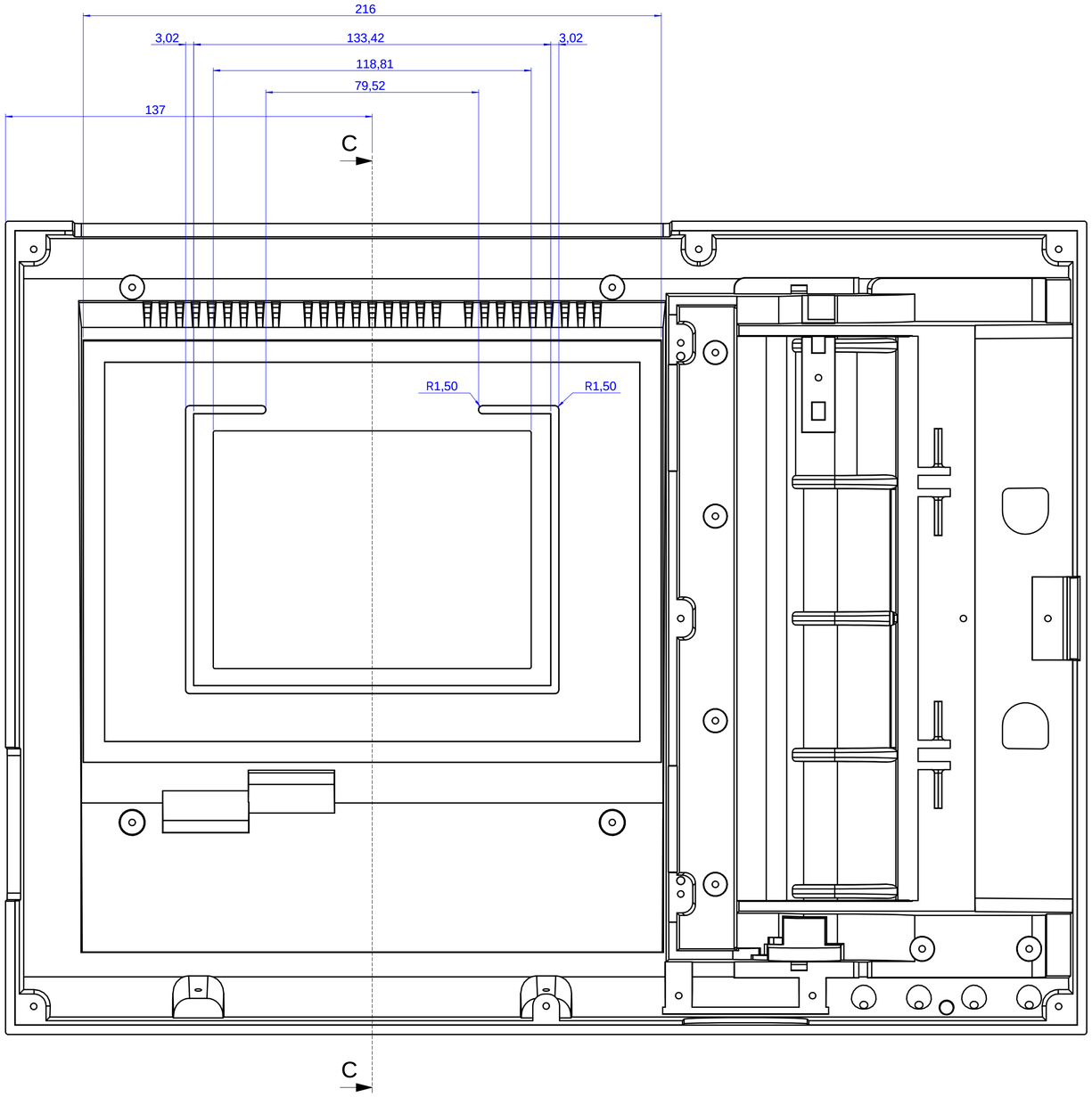


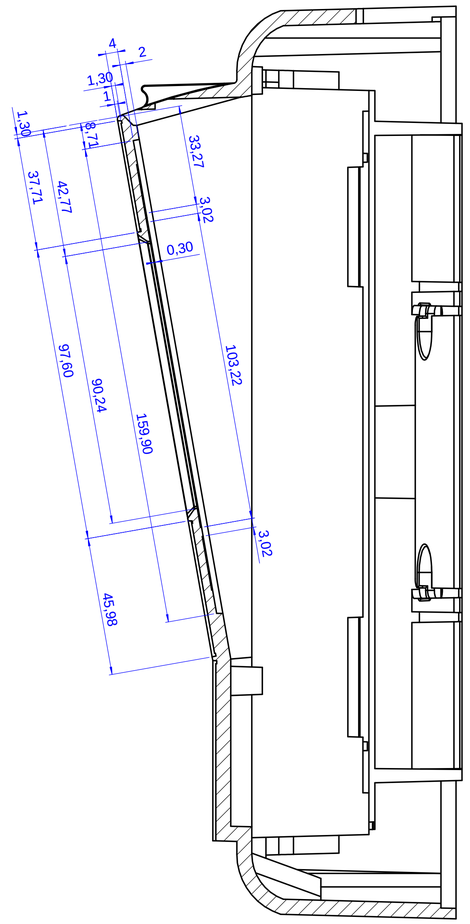


A-A

Zmena: Change No.:	Popis zmeny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pred. verze: Prev. ver.:
z1	ZÁLISKY PRO MOTOR	JM22/09/03	JM22/09/03	TN23/09/03	100

Název výrobku: Product name:	**HORNÍ KRYT (UPPER CASE)**		
Medical Technologies	Kreslil: Drawn by: **JM22/01/03**	Materiál: **SB-TSG RAL 7035 PROBARVENÉ**	
	Konstr: Designed by: **JM22/01/03**	Povrch. úprava : Surface finish:	Měřítko: Scale: **1:1**
	Schválil: Approved by: **TN23/01/03**	List: Sheet: **4** z of **7**	Číslo výkresu: Sheet number: **073-1401C100z1**

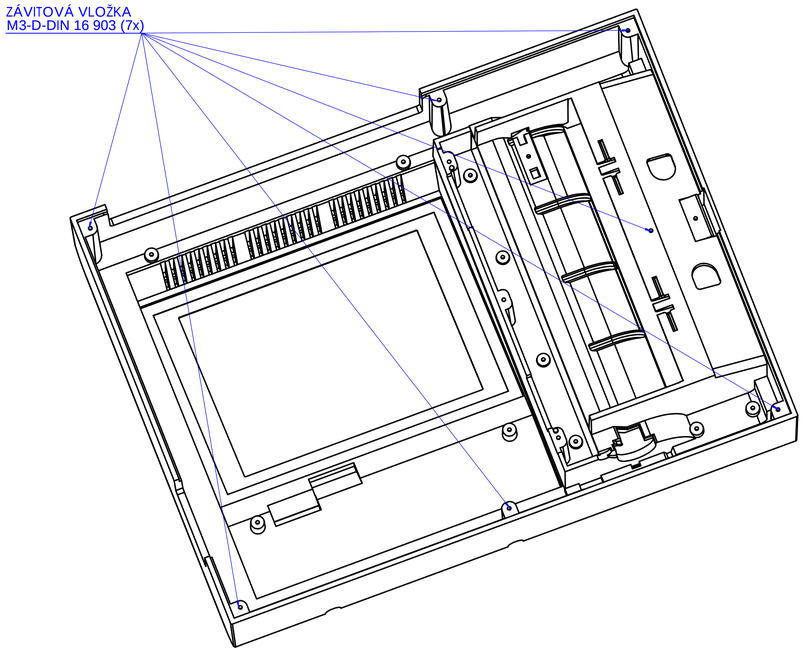


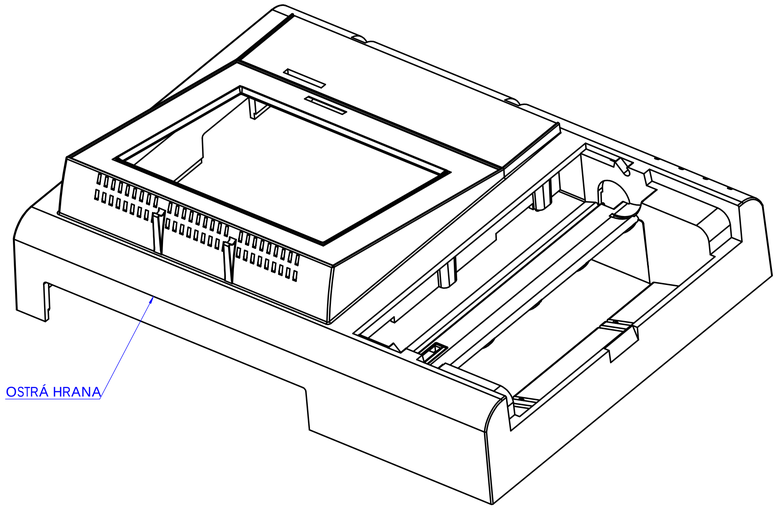


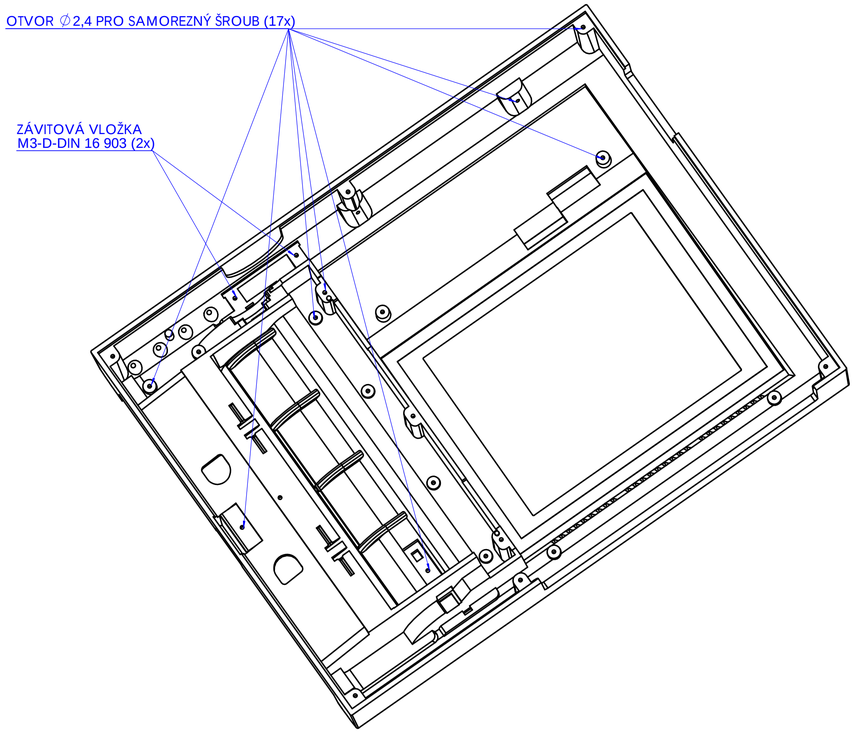
C-C

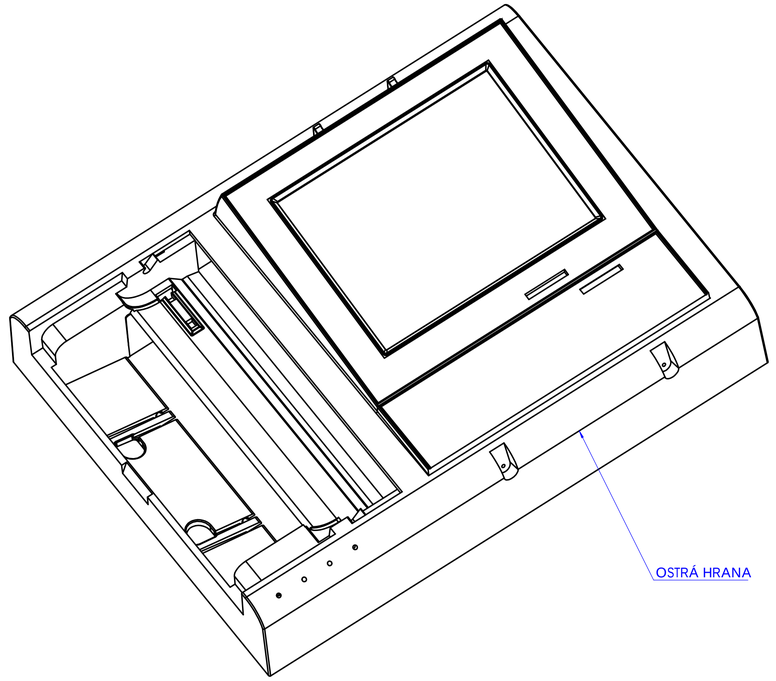
Zmena: Change No.:	Popis zmeny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pred. verze: Prev. ver.:
z1	ZÁLISKY PRO MOTOR	JM22/09/03	JM22/09/03	TN23/09/03	100

Název výrobku: Product name:	**HORNÍ KRYT (UPPER CASE)**		
Medical Technologies	Kreslil: Drawn by: **JM22/01/03**	Materiál: **SB-TSG RAL 7035 PROBARVENÉ**	
	Konstr: Designed by: **JM22/01/03**	Povrch. úprava : Surface finish:	Měřítko: Scale: **1:1**
	Schválil: Approved by: **TN23/01/03**	List: Sheet: **5** z of **7**	Číslo výkresu: Sheet number: **073-1401B100z1**



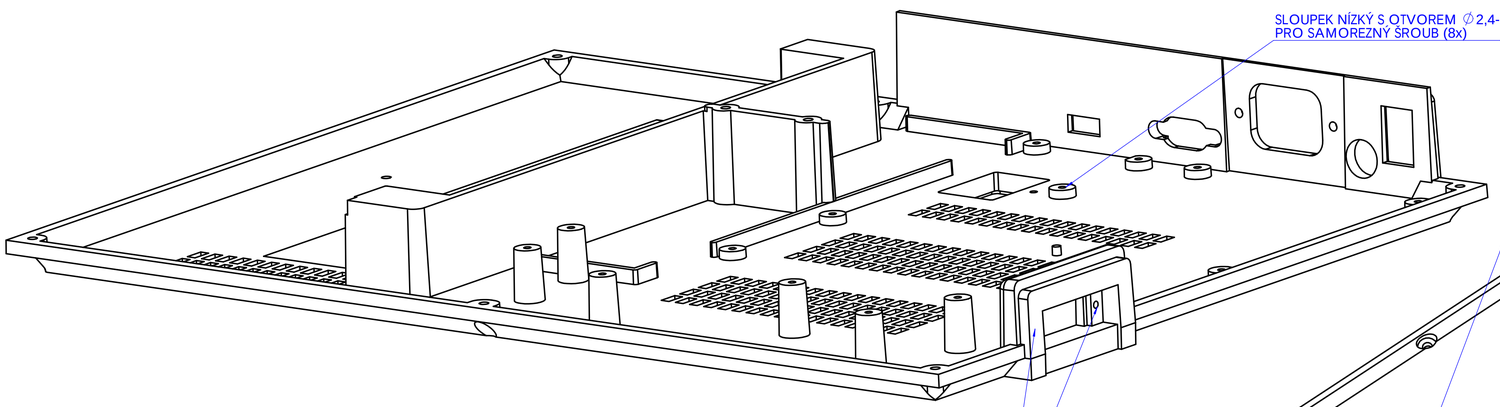






Zmena: Change No.:	Popis zmeny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pred. verze: Prev. ver.:
z1	ZÁLISKY PRO MOTOR	JM22/09/03	JM22/09/03	TN23/09/03	100

Název výrobku: Product name:	**HORNÍ KRYT (UPPER CASE)**		
Medical Technologies	Kreslil: Drawn by: **JM22/01/03**	Materiál: **SB-TSG RAL 7035 PROBARVENÉ**	
	Konstr: Designed by: **JM22/01/03**	Povrch. úprava : Surface finish:	Měřítko: Scale: **1:1**
	Schválil: Approved by: **TN23/01/03**	List: Sheet: **7** z of **7**	Číslo výkresu: Sheet number: **073-1401C100z1**



SLOUPEK NÍZKÝ S OTVOREM ∅2,4-6
PRO SAMOREZNÝ ŠROUB (8x)

ZÁVITOVÁ VLOŽKA
M3-D-DIN 16 903

ZÁVITOVÁ VLOŽKA
M4-D-DIN 16 903

ZÁVITOVÁ VLOŽKA
M4-B-DIN 16 903

ZÁVITOVÁ VLOŽKA
M3-B-DIN 16 903

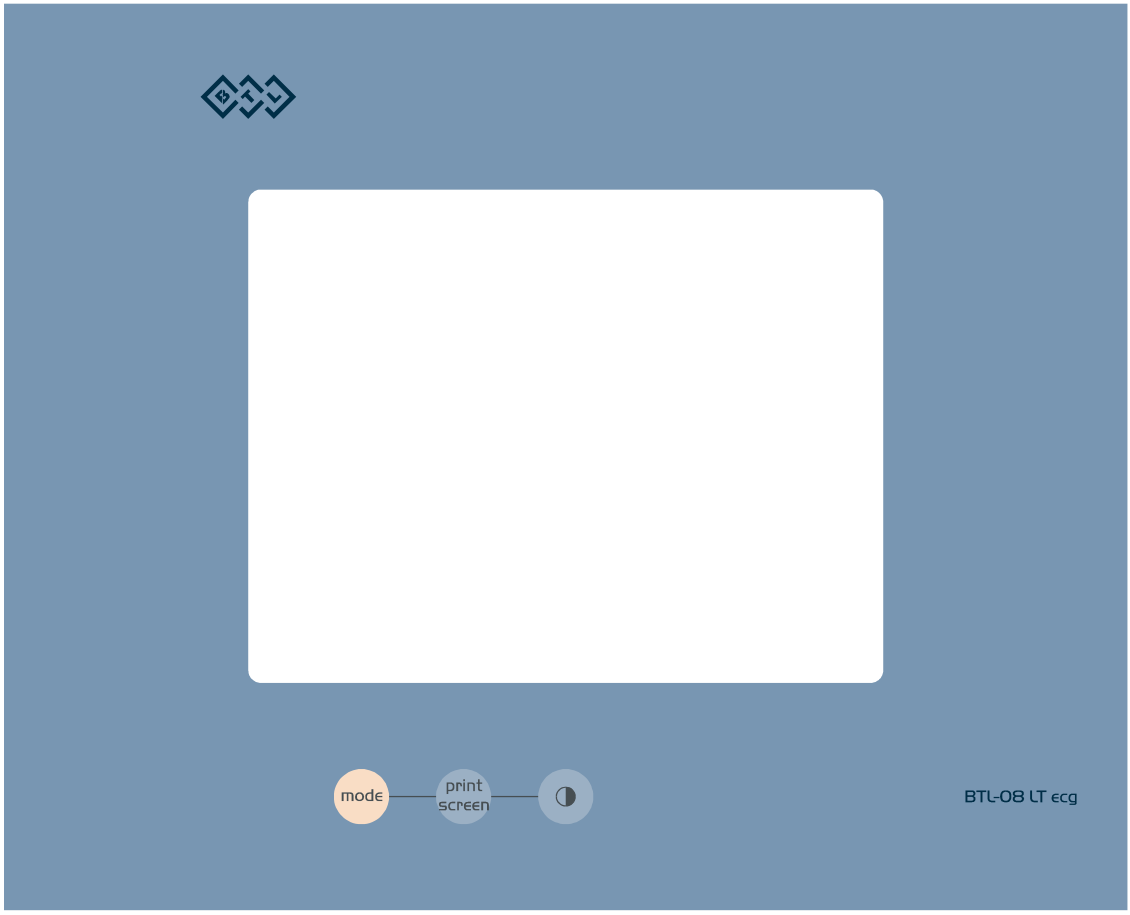
DISTANCNÍ SLOUPEK M3 GM
DA5M3X05
VIZ. REZ D-D

SLOUPEK VYSOKÝ S OTVOREM ∅ 2,4-6
PRO SAMOREZNÝ ŠROUB (6x)

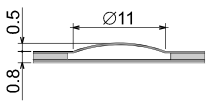
OTVOR ∅3,2-12 PRO SAMOREZNÝ ŠROUB

Zmena: Change No.:	Popis zmeny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pred. verze: Prev. ver.:
101	ZRUŠENÍ OTVORU PRO USB1 NAVÍC KAPSA PRO PAPÍR, ZÁVITOVÁ VLOŽKA M4-B	JM05/11/03	JM05/11/03	TN06/11/03	100

Název výrobku: Product name:	**SPODNÍ KRYT (BOTTOM CASE)**		
Medical Technologies	Kreslil: Drawn by: **JM20/01/03**	Materiál: **SB-TSG RAL 7045 PROBARVENÉ**	
	Konstr: Designed by: **JM20/01/03**	Povrch. úprava: Surface finish:	Měřítko: Scale: **1:1**
	Schválil: Approved by: **TN21/01/03**	List: Sheet: **3** z of **3**	Číslo výkresu: Sheet number: **073-1301101**



Material of upper layer: PET matt - see sample
Dimension: 223.9 x 180.6 x 0.8 mm
All buttons ha



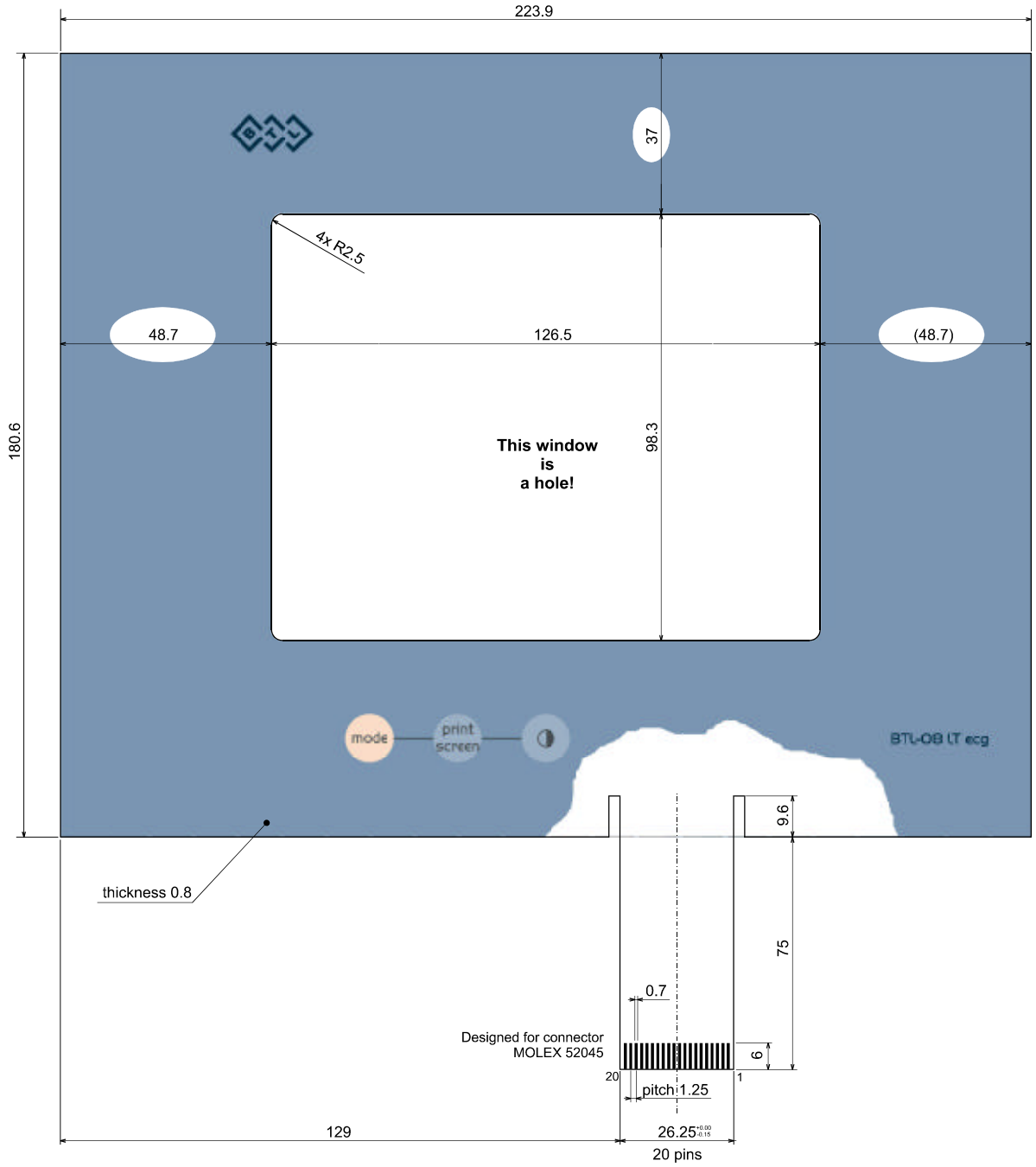
etal springs.
Window for LCD is a hole.

All conductive routes in keyboard must have distance from margin 4 mm.

	Colour by RAL:	Colour by PANTONE:
light blue	RAL 250 60 15	(PANTONE 645 C)
light blue button	RAL 250 70 15	(PANTONE 644 C)
orange	RAL 060 80 30	(PANTONE 474 C)
orange button	RAL 060 90 15	(PANTONE 475 C - not good)
yellow	RAL 085 80 40	(PANTONE 461 C)
dark blue - logo	RAL 250 30 15	(PANTONE 296 C)
gray - texts	RAL 260 30 05	(PANTONE 432 C)

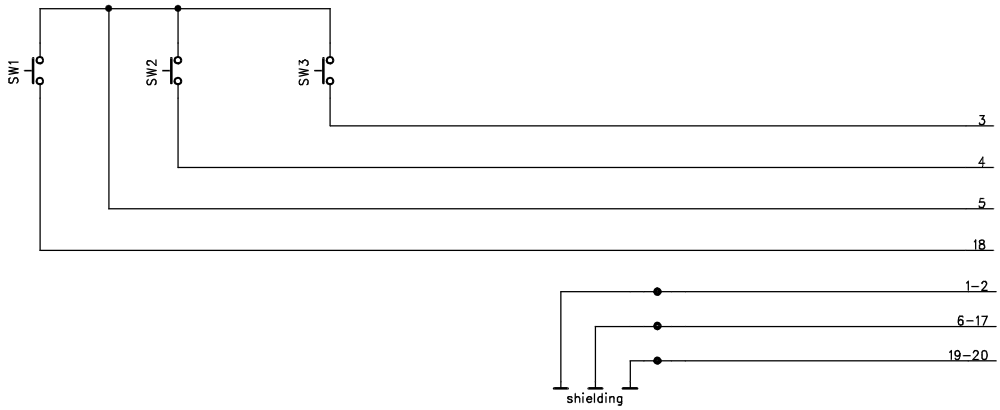
Změna: Change No.:	Popis změny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pův. verze: Previous ver.:

Název výrobku: Product name:	BTL-073 keyboard arround middle lcd - upper layer			
BTL	Kreslil: Drown by: JD13/01/2003	Materiál: Material:		
	Konstr.: Designed by: JD13/01/2003	Povrch. úprava: Surface finish: Mat		Měřítko: Scale: 1:1
	Schválil: Approved by: TN14/01/2003	List: Sheet: 1 z of 3	Číslo výkresu: Sheet number: 073-58kbd-lt104	



Změna: Change No.:	Popis změny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pův. verze: Previous ver.:

Název výrobku: Product name:	BTL-073 keyboard arround middle lcd - mechanical dimension			
BTL	Kreslil: Drown by: JD13/01/2003	Materiál: Material:		
	Konstr.: Designed by: JD13/01/2003	Povrch. úprava: Surface finish: Mat		Měřítko: Scale: 1:1
	Schválil: Approved by: TN14/01/2003	List: Sheet: 2 z of 3	Číslo výkresu: Sheet number: 073-58kbd-lt104	

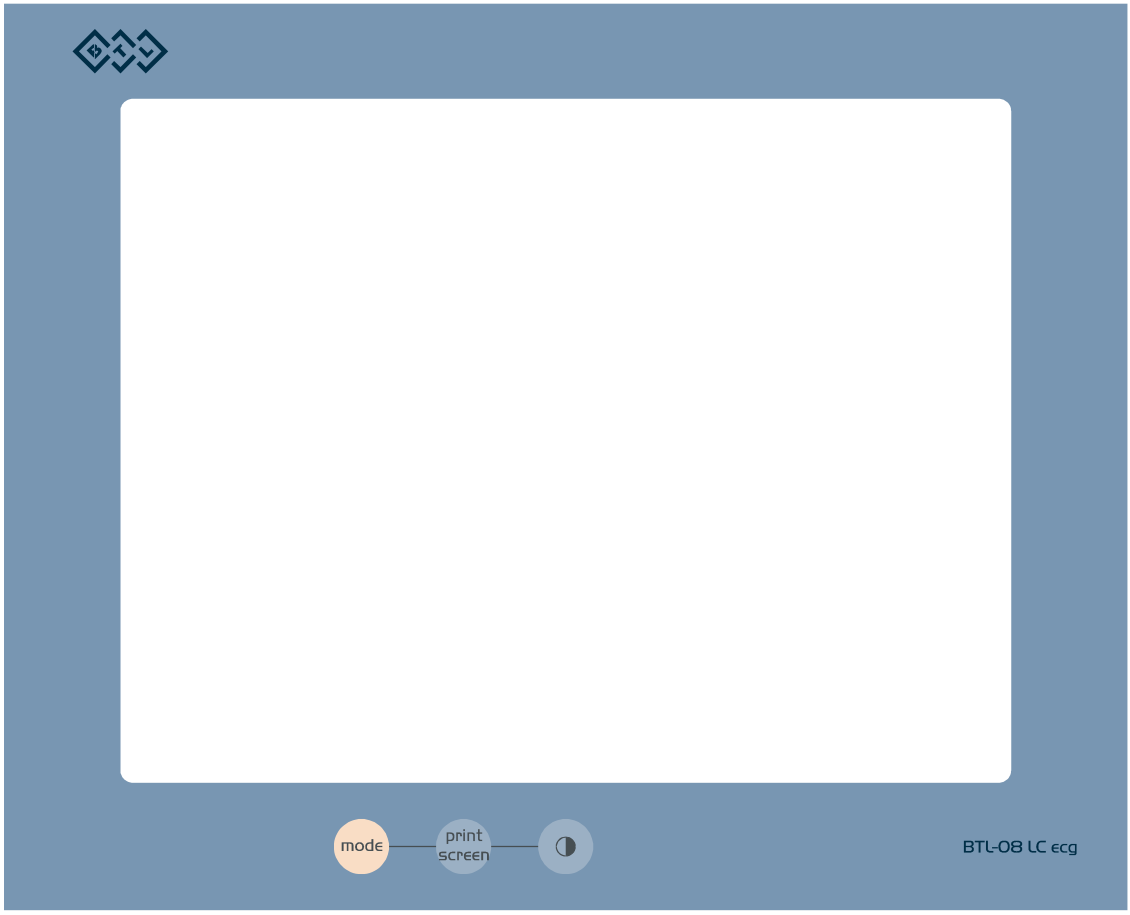


Shielding is made as copper pour in the same layer as keyboard layout.
Shielding id connected to pins 1, 2, 6 - 17, 19, 20.

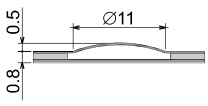
SW1 mode
SW2 print screen
SW3 contrast ◑

Změna: Change No.:	Popis změny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pův. verze: Previous ver.:

Název výrobku: Product name:	**BTL-073 keyboard arround middle lcd - electric sheet**			
BTL	Kreslil: Drown by: **JD13/01/2003**	Materiál: Material:		
	Konstr.: Designed by: **JD13/01/2003**	Povrch. úprava: Surface finish: **Mat**	Měřítko: Scale: **1:1**	
	Schválil: Approved by: **TN14/01/2003**	List: Sheet: **3** z of **3**	Číslo výkresu: Sheet number: **073-58kbd-lt104**	



Material of upper layer: PET matt - see sample
Dimension: 223.9 x 180.6 x 0.8 mm
All buttons ha



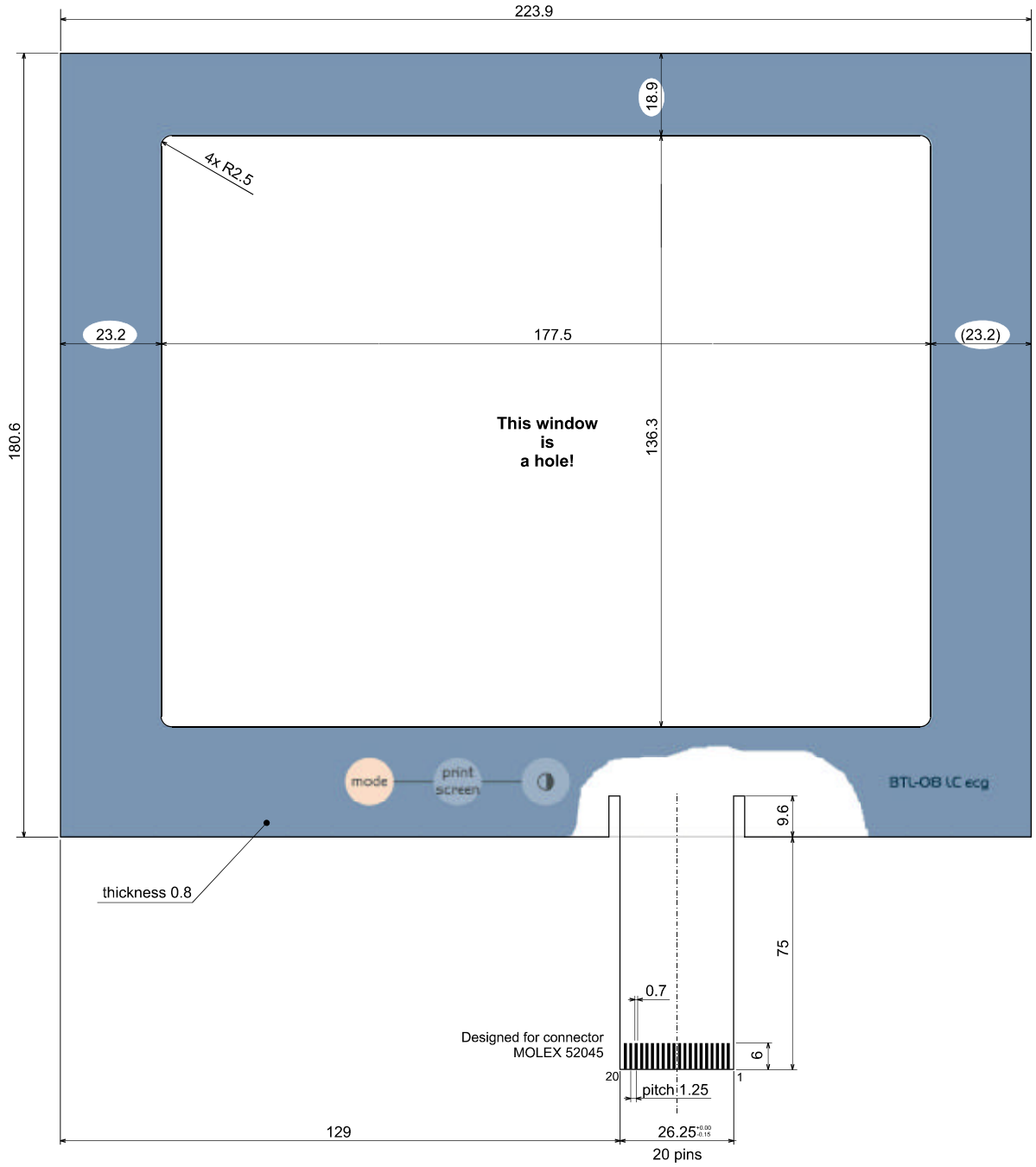
etal springs.
Window for LCD is a hole.

All conductive routes in keyboard must have distance from margin 4 mm.

	Colour by RAL:	Colour by PANTONE:
light blue	RAL 250 60 15	(PANTONE 645 C)
light blue button	RAL 250 70 15	(PANTONE 644 C)
orange	RAL 060 80 30	(PANTONE 474 C)
orange button	RAL 060 90 15	(PANTONE 475 C - not good)
yellow	RAL 085 80 40	(PANTONE 461 C)
dark blue - logo	RAL 250 30 15	(PANTONE 296 C)
gray - texts	RAL 260 30 05	(PANTONE 432 C)

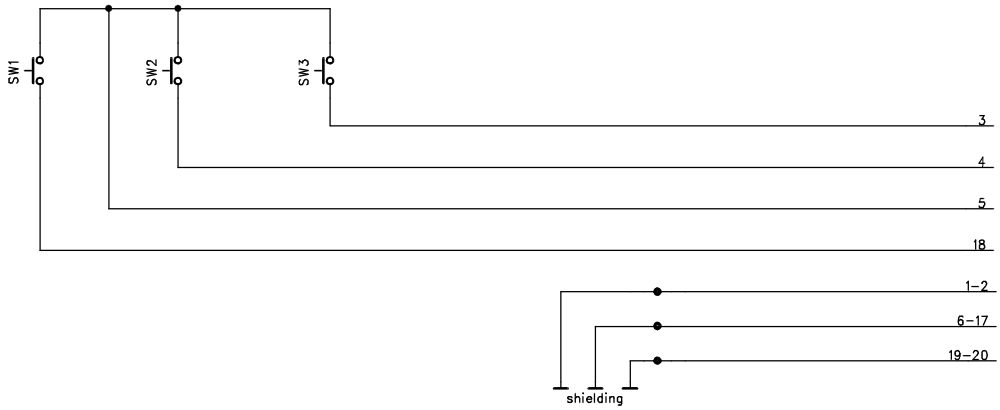
Změna: Change No.:	Popis změny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pův. verze: Previous ver.:

Název výrobku: Product name:	BTL-073 keyboard arround big lcd - upper layer			
BTL	Kreslil: Drown by: JD13/01/2003	Materiál: Material:		
	Konstr.: Designed by: JD13/01/2003	Povrch. úprava: Surface finish: Mat		Měřítko: Scale: 1:1
	Schválil: Approved by: TN14/01/2003	List: Sheet: 1 z of 3	Číslo výkresu: Sheet number: 073-58kbd-lc104	



Změna: Change No.:	Popis změny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pův. verze: Previous ver.:

Název výrobku: Product name:	**BTL-073 keyboard arround big lcd - mechanical dimension**			
BTL	Kreslil: Drown by: **JD13/01/2003**	Materiál: Material:		
	Konstr.: Designed by: **JD13/01/2003**	Povrch. úprava: Surface finish: **Mat**	Měřítko: Scale: **1:1**	
	Schválil: Approved by: **TN14/01/2003**	List: Sheet: **2** z of **3**	Číslo výkresu: Sheet number: **073-58kbd-lc104**	



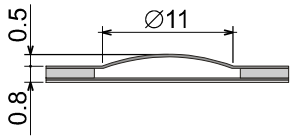
Shielding is made as copper pour in the same layer as keyboard layout.
Shielding id connected to pins 1, 2, 6 - 17, 19, 20.

SW1 mode
SW2 print screen
SW3 contrast ◑

Změna: Change No.:	Popis změny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pův. verze: Previous ver.:

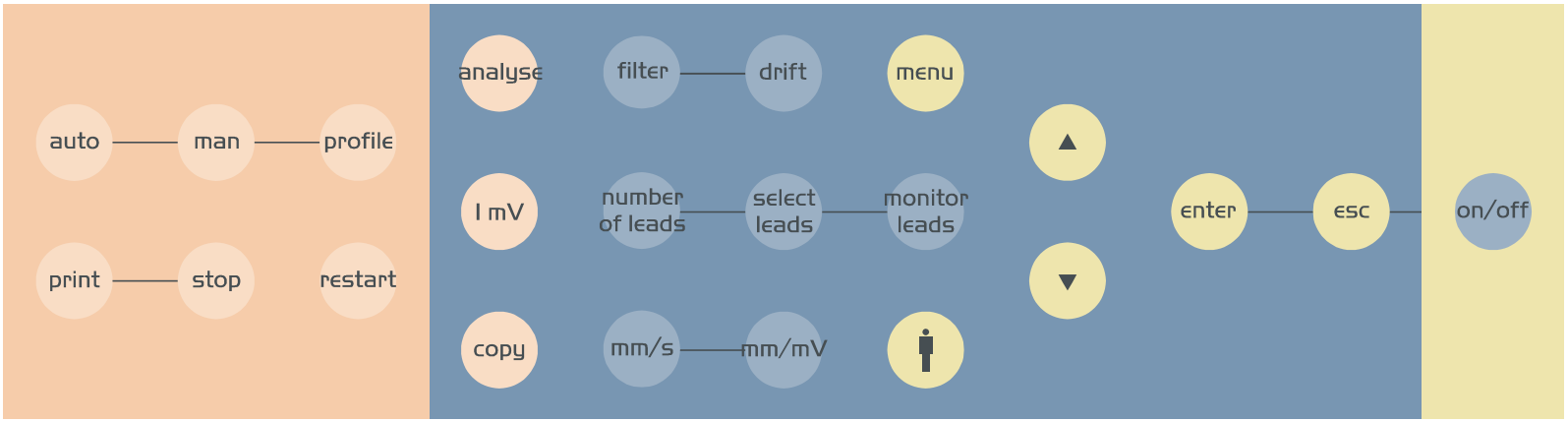
Název výrobku: Product name:	**BTL-073 keyboard arround big lcd - electric sheet**			
BTL	Kreslil: Drown by: **JD13/01/2003**	Materiál: Material:		
	Konstr.: Designed by: **JD13/01/2003**	Povrch. úprava: Surface finish: **Mat**		Měřítko: Scale: **1:1**
	Schválil: Approved by: **TN14/01/2003**	List: Sheet: **3** z of **3**	Číslo výkresu: Sheet number: **073-58kbd-lc104**	

Material of upper layer: PET matt - see sample
Dimension: 223.9 x 59.4 x 0.8 mm
All buttons have this dimension:



All buttons are without metal springs.

All conductive routes in keyboard must have distance from margin 4 mm.

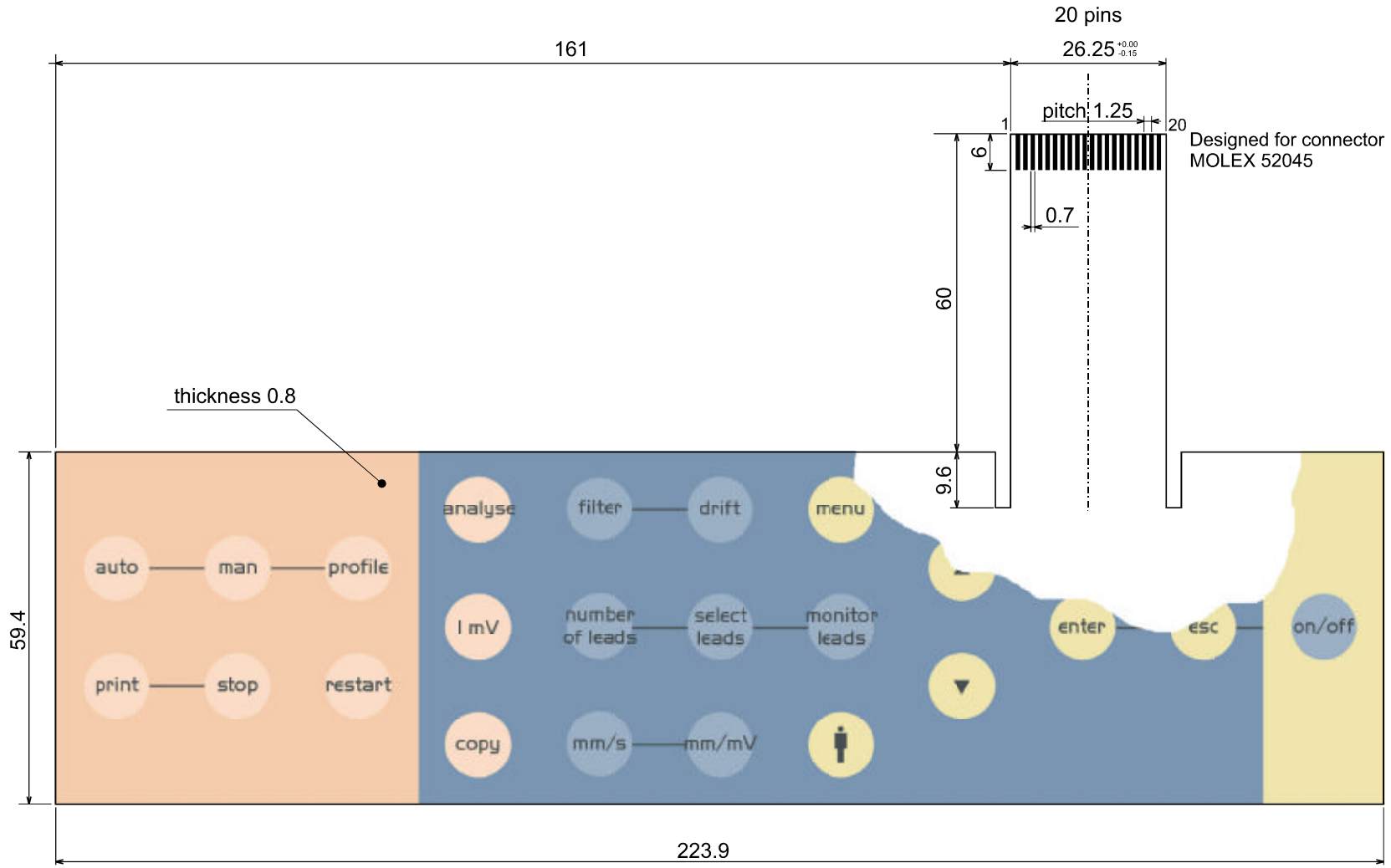


	Colour by RAL:	Colour by PANTONE:
light blue	RAL 250 60 15	(PANTONE 645 C)
light blue button	RAL 250 70 15	(PANTONE 644 C)
orange	RAL 060 80 30	(PANTONE 474 C)
orange button	RAL 060 90 15	(PANTONE 475 C - not good eq.)
yellow	RAL 085 80 40	(PANTONE 461 C)
dark blue - logo	RAL 250 30 15	(PANTONE 296 C)
gray - texts	RAL 260 30 05	(PANTONE 432 C)

Equivalents by PANTONE are aproximately identical.
Please, prefer original colours in RAL.

Změna: Change No.:	Popis změny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pův. verze: Previous ver.:

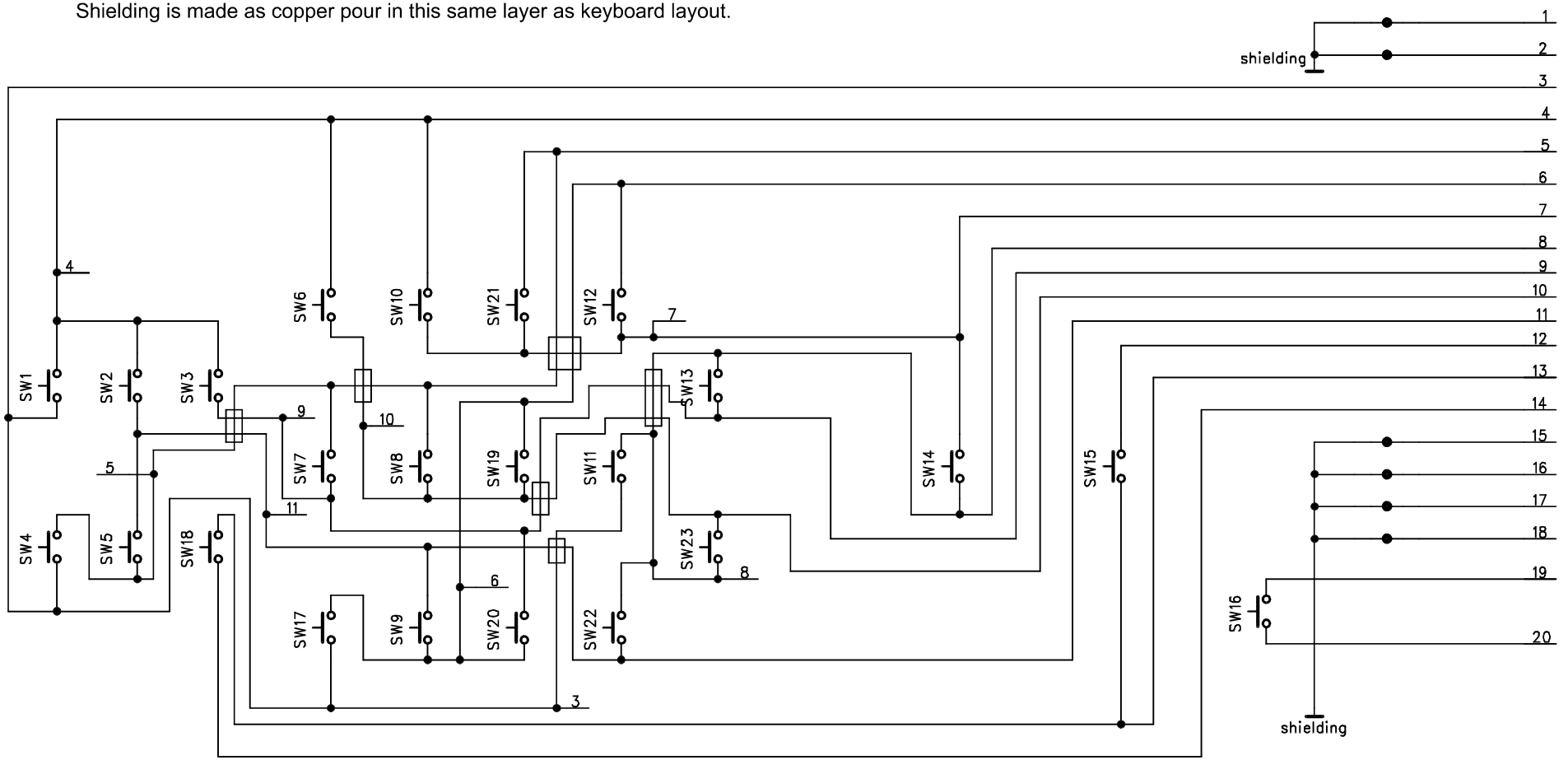
Název výrobku: Product name:	**BTL-073 functional keyboard - upper layer**			
BTL	Kreslil: Drown by: **JD10/01/2003**	Materiál: Material:		
	Konstr.: Designed by: **JD10/01/2003**	Povrch. úprava: Surface finish: **Mat**		Měřítko: Scale: **1:1**
	Schválil: Approved by: **TN13/01/2003**	List: Sheet: **1** z of **3**	Číslo výkresu: Sheet number: **073-58kbd-fc103**	



Změna: Change No.:	Popis změny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pův. verze: Previous ver.:

Název výrobku: Product name:	**BTL-073 functional keyboard - mechanical dimension**			
BTL	Kreslil: Drown by: **JD10/01/2003**	Materiál: Material:		
	Konstr.: Designed by: **JD10/01/2003**	Povrch. úprava: Surface finish: **Mat**	Měřítko: Scale: **1:1**	
	Schválil: Approved by: **TN13/01/2003**	List: Sheet: **2** z of **3**	Číslo výkresu: Sheet number: **073-58kbd-fc103**	

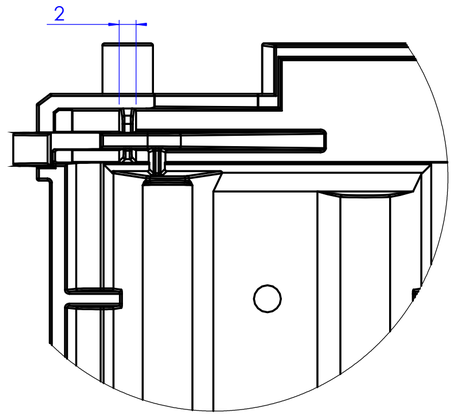
Shielding is made as copper pour in this same layer as keyboard layout.



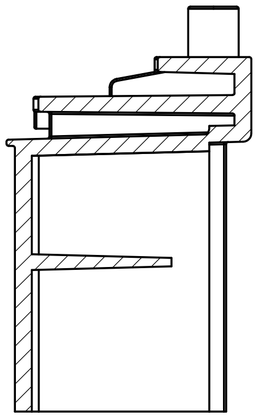
SW1	auto	SW13	up ▲
SW2	man	SW14	enter
SW3	profile	SW15	esc
SW4	print	SW16	on/off
SW5	stop	SW17	copy
SW6	analyse	SW18	restart
SW7	1 mV	SW19	select leads
SW8	number of leads	SW20	mm/mV
SW9	mm/s	SW21	drift
SW10	filter	SW22	pacient
SW11	monitor leads	SW23	down ▼
SW12	menu		

Změna: Change No.:	Popis změny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pův. verze: Previous ver.:

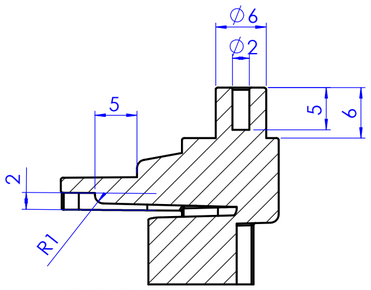
Název výrobku: Product name:	**BTL-073 functional keyboard - electric connection**			
BTL	Kreslil: Drown by: **JD10/01/2003**	Materiál: Material:		
	Konstr.: Designed by: **JD10/01/2003**	Povrch. úprava: Surface finish: **Mat**	Měřítko: Scale: **1:1**	
	Schválil: Approved by: **TN13/01/2003**	List: Sheet: **3** z of **3**	Číslo výkresu: Sheet number: **073-58kbd-fc103**	



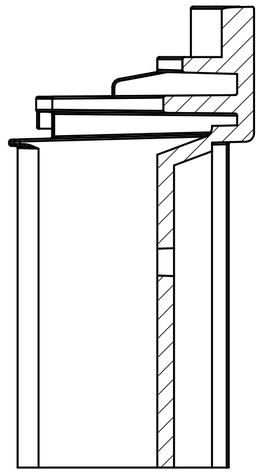
A (2 : 1)



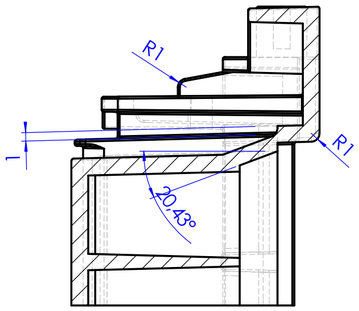
F-F (2 : 1)



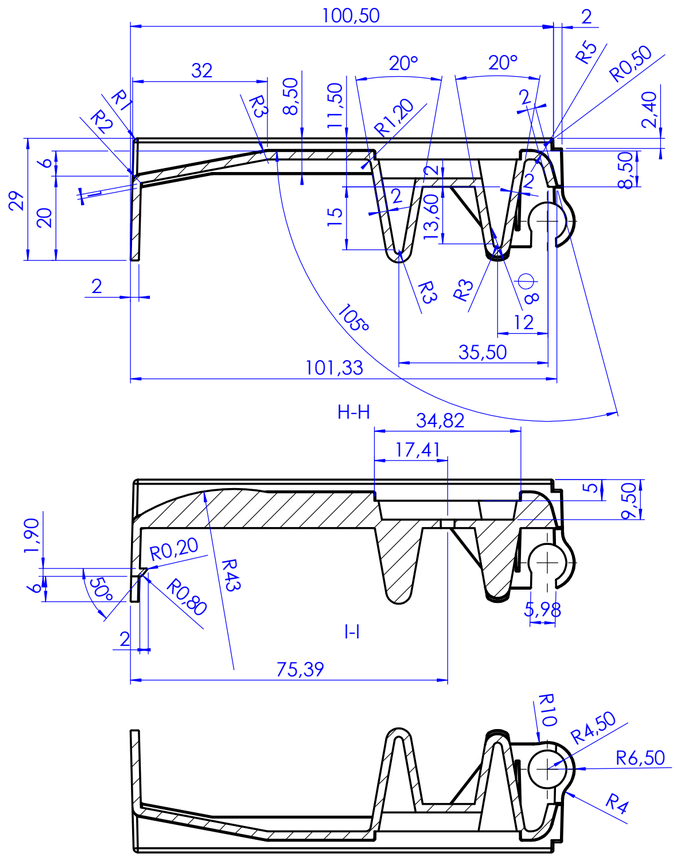
G-G (2 : 1)



E-E (2 : 1)



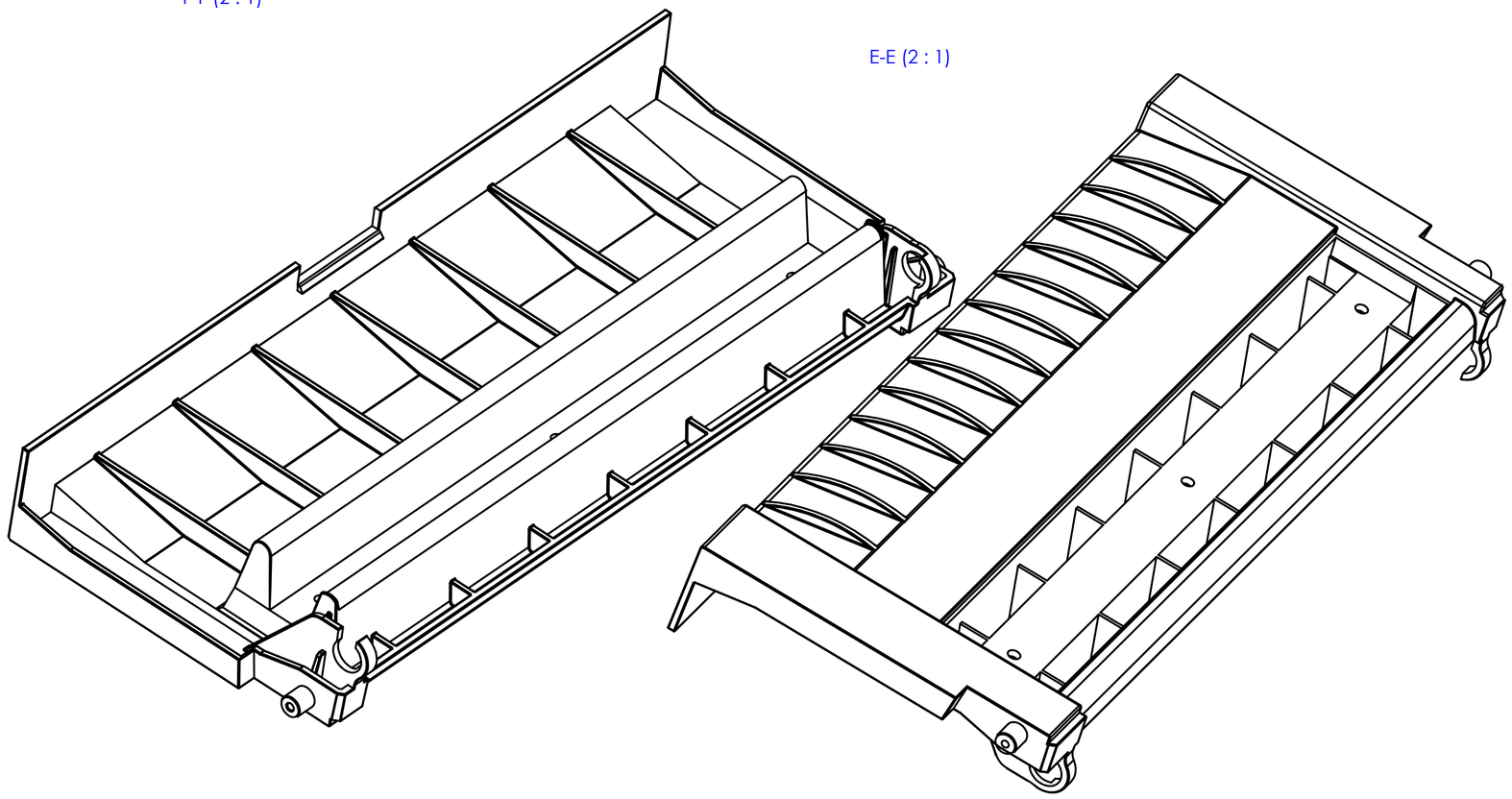
D-D (2 : 1)



H-H

I-I

J-J



Zmena: Change No.:	Popis zmeny: Change description:	Kreslil: Drawn by:	Konstruoval: Designed by:	Schválil: Approved by:	Pred. verze: Prev. ver.:

Název výrobku: Product name:	**KRYT TISKÁRNY (PRINTER'S CASE)**			
Medical Technologies	Kreslil: Drawn by: **JM17/01/03**	Materiál: **PC TRANSP. RAL 2506015**		
	Konstr: Designed by: **JM17/01/03**	Povrch. úprava : Surface finish:		Merítko: Scale: **1:1**
	Schválil: Approved by: **TN20/01/03**	List: Sheet: **2** z of **2**	Číslo výkresu: Sheet number:	**073-3011100**